
**The Value of Conservation
Easements**

*The Importance of Protecting
Nature and Open Space*

Presented by

*West Hill Foundation For Nature, Inc.
2002*

"It seems to me time for the country to take account of its natural resources," the President [Theodore Roosevelt] wrote [in 1906], "and to inquire how long they are likely to last."

The suggestion that anything so unquantifiable as the mineral and vegetable and hydrological wealth of one of the world's largest nations might, in fact, be rendered in an "account" was almost as shocking as the cold, hard tone of Roosevelt's last seven words. He wrote with the finality of a man who had, with his own eyes, seen the last few flutterings of a species that had once been capable of blackening the sky.

"We are prosperous now," he continued . . . "We should not forget that it will be just as important to our descendants to be prosperous in their time as it is to us to be prosperous in our time."

Theodore Rex,
— Edmund Morris



Is there any way now to measure even approximately what is being lost? Any attempt is almost certain to produce an underestimate . . . If humanity were to try to replace the free [ecosystem] services of the natural economy with substitutes of its own manufacture, the global GNP would have to be raised by at least \$33 trillion. The exercise, however, cannot be performed except as a thought experiment. To supplant natural ecosystems entirely, even mostly, is an economic and even physical impossibility, and we would certainly die if we tried.

The Future of Life,
— Edward O. Wilson



The significant problems we face cannot be solved at the same level of thinking we were at when we created them.

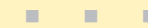
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*The Importance of Protecting
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*Discussion Paper,
World Resources Institute,
April 9, 2002*

*West Hill Foundation For Nature, Inc.
December 1, 2002*

MODEL OF POTENTIAL ANNUAL ECONOMIC RETURNS FROM PROTECTING OPEN SPACE

WEST HILL FOUNDATION FOR NATURE, INC.

The World Resources Institute (“WRI”) completed its study entitled “The Value of Conservation Easements and the Importance of Protecting Nature and Open Space” (the “Study”) in April, 2002.

Extrapolating from the Study, we are able to illustrate a range of potential annual economic benefits to be gained by investing in conservation easements to protect open space.

Based on actual land conservation expenditures by various conservation organizations totaling more than \$2.5 billion over the last fifteen years, it can be conservatively assumed that each acre protected with a Conservation Easement would cost on average \$2,000, including a 10% set aside reserve for transaction and ongoing monitoring costs.

The WRI Study includes a summary of annual per acre ecosystem benefits from a variety of studies. The resulting range of annual values for those benefits by land type are as follows:

	<u>Range of Annual</u>	<u>Mean Annual Benefit</u>
	<u>Benefits Per Acre</u>	<u>Per Acre</u>
Forest Land	(\$821 - \$1,156)	\$988
Grass and Rangelands	(\$596 - \$596)	\$596
Wetlands	(\$1,395 - \$89,742)	\$43,000
Lakes and Rivers	(\$1,532 - \$14,654)	\$7,000

Using the average estimated cost of \$2,000 per acre, if our nation invested dollars to buy easements to conserve or restore “Grass and Rangelands”, the annual economic return would be just over 25% per acre; whereas if, at the other end of the spectrum, it used all of the dollars to protect the highest valued Wetlands, the potential annual economic return would be a multiple of almost 45 times.

The greater probability, however, is that our nation on average would invest the available dollars across all four land categories and that the annual benefit would be close to the mean values. Therefore, assuming an equal acreage allocation among each of the above four categories at an annual value approximating the mean values, the annual return from the estimated \$2,000 per acre original investment would exceed \$12,000. Thus, this one-time investment of \$2,000 per acre would yield a 6x return in the first year, and this return would be the same or greater each and every year thereafter. **Under this model, a nationwide aggregate investment in conservation easements of \$5 billion (protecting 2,500,000 acres) would, beginning at the end of the first year investment, produce annual ecosystems benefits exceeding \$30 billion.**

Chris Glenn Sawyer

President

Discussion Paper
December 1, 2002

PREFACE: Refining America: The Critical Opportunity

West Hill Foundation for Nature

As part of our work, the West Hill Foundation for Nature commissioned and funded the World Resources Institute to conduct the study which is reported in “The Value of Conservation Easements: The Importance of Protecting Nature and Open Space.”

When Carl Knobloch and I started the West Hill Foundation for Nature in 1999, our initial perspective was that we would focus on the preservation of “flora and fauna” in the United States. Because of our previous experiences, we thought that our Foundation would best serve this mission by focusing on working with other existing conservation organizations on developing new conservation strategies and facilitating additional sources of conservation financing.

To begin our journey and our service, we invited and met individually with approximately twenty different conservation programs over a forty day period during the summer of 1999. The organizations included the Trust for Public Land, The Nature Conservancy, the Jackson Hole Land Trust, Ducks Unlimited, the Montana Land Reliance, the National Park Service, and many others.

The results of this intensive survey course were startling and deeply troubling. While we found, as we had expected, that these organizations were doing quite extraordinary jobs, those achievements were not remotely in proportion to the critical and enormous needs of our country’s natural infrastructure. As our conversations with these organizations and other programs throughout the United States evolved and expanded, we also began to discover just how compromised and imperiled our natural infrastructure and ecosystem had become.

This initial and continuing insight led to a surprising sharpening of our focus. We began to address directly the issue of how do we as a nation best invest in our natural infrastructure, not just to restore it, but also to conserve it permanently for the economic health and enjoyment of future generations. While we certainly believe that one can argue persuasively for the moral necessity of answering this question correctly and acting upon it, we have also become very aware that this question, perhaps just as importantly, addresses the continuing viability of the essential physical platform for this nation’s historical wealth, power and strength. Given the current diminished and deteriorating state of this platform, it is simply an issue that our nation can no longer afford to avoid.

As we have considered solutions to this question, we are constantly confronted with the scale of land conservation that must be accomplished. Given the current crisis, the scale must obviously be beyond what we have attempted historically and currently to achieve.

As we have learned more about the magnitude of the need, we have increasingly come to the conclusion that while some strategic acquisition of land will be required, the vast majority of land conservation must be accomplished in a manner that achieves conservation benefits for the nation but leaves the land in private ownership. Public acquisition is simply too expensive, and beyond that, maintaining these lands in private ownership is critical to cost-effective long-term stewardship and management as well as to our culture.

The only legal tool that effectively provides for structuring of land conservation in this manner is a conservation easement. Fortunately, we now have more than thirty years of experience with using this legal tool.

As we focused on the issue of how to structure a solution that scales to the needs of the nation around the use of conservation easements, another issue emerged. Because our natural systems are indifferent to political borders, creating a system that involves every state is critical. While this is self-evident, the reality of this requirement complicates the task immeasurably because the geography, land use and practice, and conservation needs vary so widely from one ecological region to another. If conservation easements were to be at the center of a solution that requires work in all of these settings, would their use be effective in all of them?

This issue began to reflect another issue that a few would raise more directly: is conservation on this scale really cost effective? While more would argue that preserving the physical platform for our economic wealth, strength and power is, like our national defense, worthy of any rational expenditure, the issue of cost and returns are always an ultimate measure of reality.

Against this history, and with the assistance of James Gustave Speth, Dean of the Yale School of Forestry and Environmental Studies, we asked the World Resources Institute to consider two central issues for us: (i) could conservation easements be meaningfully and effectively used to achieve conservation goals across the diversity of this nation; and (ii) would it be a cost-effective means of doing it?

While we allowed the Institute total freedom in its study of these issues, we did request that it include in its survey three specific case studies: the Atlanta metropolitan area; the State of Iowa; and the area of Wyoming around the Yellowstone and Grand Teton National Parks. With this specific focus on urban sprawl, advanced agricultural practice, and a natural resource park and resort area, we knew that we would obtain a diverse test of these issues.

After compiling and considering hundreds of studies that have been conducted across the nation over the last thirty or so years, the Institute's work leads to very clear conclusions: conservation easements would be extraordinarily effective in all of this nation's diverse settings and, perhaps of even more significance, the positive return on our investment, as shown in the preceeding "Range of Potential Annual Economic Returns", is potentially staggering.

And that is hopeful news. Because the other message explicit in this World Resources Institute study, including in each of the three diverse areas for our case studies, is that our natural estate is in fact greatly diminished and that we can no longer wait another day to begin to restore and conserve it for ourselves and all generations to follow.

Amanda Sauer

World Resources Institute

Discussion Paper

April 9, 2002

The Value of Conservation Easements

The Importance of Protecting Nature and Open Space

Regarding nature, we are a nation of contradiction, shortsightedness, and neglect. In Atlanta we create a world-class zoo to house some of the world's endangered species as we drive native species into extinction with housing developments, shopping malls, and office parks. We journey to Wyoming to experience the splendors of untamed wilderness while our desires for recreational homes fragment the land upon which wildlife depends. Our universities in Iowa are leaders in the study of sustainable agriculture, yet the rich soils on which we grow our food were created by prairie ecosystems that no longer exist. By ignoring the importance of nature in our economy, we are systematically degrading the base upon which all life depends. How long will critical natural areas last if they are deemed economically worthless? How long will it take before we recognize our dependence on nature for health, prosperity, and quality of life? Can we afford to find out?

Our actions that degrade the environment are not malicious but rather the consequence of economic policies where nature is free for the taking. More often than not, it is more profitable to convert open space into residential or commercial uses than to leave it undeveloped, resulting in the widespread loss of natural and rural areas. To protect the open space that sustains natural processes is the most important investment we can make, yielding returns that can be measured in terms of clean air and water, medicinal discoveries, flood control, artistic inspiration, fertile soils, hunting grounds, and a stable climate.

Open space and its supporting habitat is being lost at a rate of nearly 2,000 acres a day in the United States.¹ Not only a pervasive problem, with roots in numerous subsequent environmental and social issues, the loss of open space actually depletes our capacity to deal with other environmental problems and diminishes opportunities for discovering new solutions. Land conservation is not a new concept in American history, yet it has not been deployed at a rate or scale that will ultimately save the ecosystems and open space upon which we depend. Most of the efforts to protect ecosystems and biodiversity have been focused on less than a third of the land that is owned by the federal government, even though the majority of the land in the United States is privately owned.² In the lower 48 states, private cropland, pasture and rangelands account for 48 percent of the total land area while private forests take up about 22 percent.³ This means that many important ecosystems, threatened species, migration habitats, scenic areas, and open spaces are out of the reach of public conservation efforts because they exist exclusively on private lands.

Conservation easements are a legal tool for protecting private lands from future development by voluntarily imposing limitations on land uses and development rights. Under this type of easement, parties can agree to never allow open space land to be converted to other uses and to regulate existing practices to improve environmental conditions. By keeping land in private hands and preserving open space for the public, conservation easements are a flexible way to achieve important environmental and agricultural objectives for both private and public good. While it is impossible to bring every ecosystem benefit and open space value into our market-based economy, conservation easements offer a highly productive way to protect these substantial assets for the future.

To save open spaces, conservation easements must become a priority for legislators and create incentives for average landowners, farmers, and ranchers to choose protection over development. Open spaces need to be maintained and passed down to future generations without the pressure from increasing property values driving taxes beyond the owner's ability to pay. Furthermore, farmers and ranchers can protect many important ecosystem services (such as carbon sequestration, wildlife habitat, and flood control) through agricultural operations. Conservation easements can be linked to specific agricultural processes to improve the environmental impact of agriculture. With proper incentives, management, and regulation, conservation easements can allow property owners the choice of keeping their land while providing an opportunity for local communities to maintain open space and improve environmental quality.

Why do we need nature and open space?

Nature provides us with ecosystem goods and services, which are the flow of materials, energy, and information from the biosphere upon which human existence depends. Thinking of nature in terms of ecosystem services is relatively new, brought about by the realization that natural areas are being threatened as population increases, urban areas spread into agricultural lands, and natural resources face limits. Ecosystems provide innumerable goods and services to our health and our economy, including carbon sequestration, water supply, flood control, drinking water, erosion control, soil formation, nutrient cycling, waste treatment, pollination, food production, raw materials, recreation, and culture (see Figure 1 for a detailed list of ecosystem services).

Natural systems are highly complex and interlinked. Even though science and technology have advanced, we still do not understand completely how these systems work, how to recreate them after they are diminished or destroyed, or how to manufacture artificial substitutes to carry out the functions of ecosystem services. Forests perform many examples of ecosystem services. For example:

- Forests improve and maintain air quality by trapping and removing tiny particles of soot and dust from the air that would otherwise damage human lungs. This service is especially beneficial to urban, industrial, and agricultural areas where other forms of air quality improvements are usually difficult and expensive to administer.
- Forests prevent sedimentation of rivers and streams by trapping soil that would otherwise run off, decreasing the river's capacity to absorb flooding. The loss of forested areas can result in severe flooding, necessitating the construction of stormwater management systems that can cost hundreds of millions of dollars.

Figure 1. Summary of Ecosystem Goods and Services

Ecosystem Service	Ecosystem Function	Examples
Atmospheric stabilization	Stabilization of atmospheric chemical composition.	CO ₂ /O ₂ balance, Ozone for protection against UVB rays, and SO _x levels.
Climate stabilization	Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global and local levels.	Greenhouse gas regulation, cloud formation.
Disturbance avoidance	Integrity of ecosystem responses to environmental fluctuations.	Storm protection, flood control, drought recovery, and other aspects of habitat response to environmental variability mainly controlled by vegetation structure.
Water stabilization	Stabilization of hydrological flows.	Supplying of water for agriculture (i.e. irrigation) or industrial (i.e. mining) processes or transportation.
Water supply	Storage and retention of water.	Storing of water by watersheds, reservoirs, and aquifers.
Erosion control and sediment retention	Retention of soil within an ecosystem.	Prevention of loss of soil by wind, runoff, or other removal processes, storage of silt in lakes and wetlands.
Soil formation	Soil formation processes.	Weathering of rock and the accumulation of organic material.
Nutrient cycling	Storage, internal cycling, processing, and acquisition of nutrients.	Nitrogen fixation, Nitrogen, Phosphorus, and other elemental or nutrient cycles.
Waste treatment	Recovery of mobile nutrients and removal or breakdown of excess or nutrients and compounds.	Waste treatment, pollution control, and detoxification.
Pollination	Movement of floral pollinators.	Providing of pollinators for the reproduction of plant populations.
Biological control	Regulation of populations.	Predator control of prey species.
Habitat	Habitat for resident and transient populations.	Nurseries, habitat for migratory species, regional habitats for locally harvested species, or over wintering grounds.
Raw materials	That portion of gross primary production extractable as raw materials.	The production of lumber, fuels, or fodder.
Genetic resources	Sources of unique biological materials and products.	Medicine, products for materials science, genes for resistance to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants).
Recreation	Providing opportunities for recreational activities.	Eco-tourism, sport fishing, and other outdoor recreational activities.
Cultural	Providing opportunities for non-commercial uses.	Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems.

Source: Costanza et al., 1997

- Forests improve water quality by filtering pollutants and protecting drinking water. This important function is not readily replaceable. Even state of the art, billion dollar water treatment facilities still allow a sizable percentage of the pollutants to pass through the system.
- Forests absorb and store (or “sequester”) carbon, removing it from the atmosphere and helping to mitigate global climate change. Trees offer an inexpensive opportunity to reduce carbon accumulation in the atmosphere. The loss of one tree’s carbon storage and sequestration functions can translate into an emission increase equivalent to 10 private motor vehicles.
- Forests provide recreational benefits, such as hiking, hunting, and birdwatching that are important enhancements to our lives.
- Forests can increase property values and quality of life for nearby residents.
- People benefit from the aesthetics of trees and their ability to provide buffers against noise, providing greater beauty, peace, and quiet in our communities.

Forests provide many benefits that are difficult, if not impossible, to replace once they are destroyed. For example it may be possible (although expensive) to build stormwater treatment and water filtration facilities to compensate for the lost water benefits of trees, yet the other benefits of trees, such as carbon sequestration, recreational, and air quality, are not replaceable by these facilities. Furthermore, the loss of a forest can disrupt nearby riparian and wetland ecosystems and affect their ability to function, resulting in a further loss of nature’s services. Ecosystem services are highly dependent upon one another and when one becomes impaired, the repercussions are felt throughout the entire system.

Open spaces, or natural, park, and rural lands, are critical to supporting ecosystems, which must be healthy

in order for us to receive the benefits of their services. In addition to their ecological services, open spaces provide important social benefits to society because people both need and want access to undeveloped areas. Because open space often defines the character of a region, the loss of it to development can involve a transformation of identity and a sense of cultural loss for local communities. These areas also provide value to nearby urban centers that gain aesthetic and recreational amenities by having access to these lands, if only to escape the city for a weekend.

An important benefit of preserving open space is the control of unchecked growth and development. Property values often increase when open space areas are protected and costs associated with unbalanced growth can be avoided. Although population growth can enlarge the tax base by increasing property values and the number of taxpayers, residential development often demands more in infrastructure costs than is generated in tax revenues, especially in the short-term. The additional costs of building additional schools and sewage, stormwater retention, and water treatment facilities can often exceed gains in tax revenues. For example:

- New Jersey communities would save \$1.3 billion in infrastructure costs by avoiding unplanned sprawl development by 2020.⁴
- Modest implementation of higher-density development would save the state of South Carolina \$2.7 billion in capital infrastructure over 20 years.⁵
- In Loudoun County, Virginia, costs to service new residential development units exceed their tax contribution by as much as \$2.3 million.⁶ Beyond budgetary concerns, open space contributes to better living standards by providing recreational and aesthetic benefits. Quality of life is an important factor for many people when considering a new place to live, and local businesses benefit from attracting more qualified employees who appreciate open space amenities and

demand higher standards of living. For this reason, the local economy receives direct benefits from the existence of open space in populated areas.

What is the value of nature and open space?

How can a monetary value be given to natural processes and benefits that are not generally recognized by economic markets? For example, what is the financial valuation of a tree’s water purifying function, which clearly has worth but does not receive compensation? Ecological and environmental economists have studied this problem for several decades, resulting in the development of several methods to derive economic value from ecosystem services. Any attempt to place a price tag on nature or open space is bound to raise eyebrows, yet not undertaking this endeavor only assures that the current pattern of underestimating the value of nature and open space will continue.

Methods used by economists to derive the value of non-market goods and services include:

- Comparison of property values of land with open space benefits to comparable land without access to these benefits in order to derive its value to residential properties (hedonic pricing).
- Estimation of damages or costs avoided by preserving an area or a function to determine the value of that area or function (damage avoided).
- Surveying people to find out the amount of money that they are willing to pay to prevent the loss of an ecosystem benefit or open space to find out the value of the benefit or the area to the public (contingent valuation).
- Tabulating the amount of money and time people spend to travel to recreation areas or the amount of money they spend to pursue a recreational activity to estimate the value of the area that supports the activity (travel cost).

These methods are imperfect, yet they show that ecological services and open spaces are economically valuable. The hope behind these methods is to one day bring ecological services and open space benefits into the marketplace, so that they will be incorporated into decisions affecting their future. That day appears to be a long way off from today's economic practices. It is unlikely that our current system will evolve in this direction without widespread regulatory intervention or a revolution in people's attitudes towards nature and open space.

Many studies have been conducted to value nature and open space for academic and planning purposes. (See Figure 2 for examples of values associated with key ecosystem and open space benefits). Beyond the academic realm, private corporations, municipal governments, and voters are demonstrating a financial commitment to safeguarding natural ecosystems and open space. In the private sector, an unprecedented attempt to include ecosystem benefits in property values is currently underway in West Virginia. At the end of January 2002, Allegheny Energy Inc. announced plans to sell roughly 12,000 acres of the Canaan Valley to the U.S. Fish and Wildlife service. In order to calculate the value of the land for tax purposes, the power company included the worth of the land's ecosystems and came up with a figure that more than doubled previous estimates. The area contains a system of wetlands valued at \$8,000/acre and forests with potential carbon sequestration benefits totaling \$7 million, raising the appraised worth from \$16 million to \$32 million.¹⁷ Despite concerns about the incentives behind the specific valuation techniques or numbers, they show that ecosystem services provide substantial value to society.

Municipal governments have been among the most supportive of conserving ecosystem services, largely because they bear the burden of infrastructure costs necessary to replace lost services. A well known example is that of the City of New York, which

Figure 2. Examples of Valuation Studies

The value of water quality and water supply stabilization

- Trees in all metropolitan areas in the U.S. contribute \$400 billion per year in storm-water retention by eliminating the need for expensive storm-water retention facilities.⁷¹
- Swamps, wetlands, and floodplains provide \$11,240-\$89,740/acre per year in disturbance avoidance, water supply, water filtration and waste treatment benefits.⁸

The value of air quality

- The trees of Chicago are worth \$9.2 million/year for removing 15 metric tons of carbon monoxide, 84 tons of sulfur dioxide, 89 tons of nitrogen dioxide, 191 tons of ozone and 212 tons of small particulates from the air of the metro area.⁹
- The Conservation Reserve Program, which has restored 36 million acres of farmland to natural land, has created \$548 million in annual air quality benefits alone, mainly from reduced health risks and cleaning costs associated with blowing dust.¹⁰

The value of carbon sequestration

- Canadian forests provide carbon sequestration benefits to mitigate global climate change valued at \$865-\$1,018/acre per year.¹¹
- The 42 million acres of national forest roadless areas provide \$490 million - \$1 billion per year in carbon sequestration benefits to the U.S.¹²

The effects on property values

- In Boulder, Colorado, residential property values increase by \$1,915/acre for every acre closer to the greenbelt, all other factors being equal.¹³
- In the Green Mountain Area of Maine, New Hampshire, Vermont, and New York, land parcels located in towns with wilderness are worth 13% more per acre than equivalent properties in towns without wilderness.¹⁴

The value of nature recreation

- In 1996, Americans spent \$100 billion on fishing, hunting, and wildlife-watching activities.¹⁵
- The net benefit of freshwater recreation has been estimated at \$32 billion/year.¹⁶

has decided to spend \$1.8 billion to protect 80,000 acres of its upstate watershed instead of constructing a \$8 billion water filtration plant with additional operating costs of \$300 million a year.¹⁸ By protecting and restoring the ecosystems upstream, New York City is paying for the water quality benefits of ecosystem services received downstream – and at a bargain compared to the cost of constructing and operating a new water treatment facility. Another example is the Napa Valley of California, which has spent \$160 million to restore floodplains along the Napa River to prevent flooding that has caused \$500 million in flood damage since 1960.¹⁹ From these decisions we can see that ecosystem conservation is often the least-cost alternative to dealing with emerging environmental problems.

Land conservation organizations have known about the link between ecosystem services and public benefits for quite some time. An example is the Sterling Forest acquisition in New Jersey. In 1998, The Trust for Public Land, working with numerous public and private partners, acquired the 15,000-acre Sterling Forest on the borders of New York and New Jersey for approximately \$55 million. Because the forest filters 25 percent of the drinking water for New Jersey, hydrologists estimated that the public would have to have spent \$600 million to build a mechanical water filtering plant (in addition to on-going operating and maintenance costs) had the forest been developed as otherwise proposed.²⁰ This example shows once again that ecosystems often provide the least cost alternative to protecting essential services.

Ordinary people are also demonstrating the value of open space to themselves and their community. Conservation measures are generally popular among voters, who appreciate first-hand the benefits of open and recreational space. In 2001, voters approved 137 local ballot measures for land conservation, committing almost \$1.7 billion in funding for parks and open space.²¹ Since 1998, voters have supported more than \$19 billion in

open space funding by passing 529 referenda.²² In the last four years, over 80 percent of all conservation and open space measures have been passed. The protection of open space also generates support from the American public as a whole. According to a recent poll by the American Farmland Trust, the majority of Americans say they want to use federal dollars to keep farmland from being developed. Their main concerns are safe drinking water, fresh produce in their area, and the protection of scenic farmlands.²³ These sentiments are not captured in the market value of open space, yet they exist and will intensify as incomes continue to increase and open spaces are lost.

Why are there threats to nature and open space?

If nature and open space are so valuable, why are they disappearing? The primary answer is twofold: 1) the value of nature and open space is not included in economic transactions in the marketplace and 2) we are growing rapidly in population, land usage, resource consumption, and waste generation. Most of our population now resides in urban and metropolitan areas. However that population is growing and expanding outwards from city centers as nearby open spaces are converted into standardized subdivisions, strip commercial areas, office parks and roadways. This trend has been described as “urban sprawl” and is a controversial process with economic, social, and ecological tradeoffs that are difficult to define and regulate. Negative consequences of sprawl include air and water pollution, loss of natural areas and the services they provide, infrastructure costs, loss of productive farmland, and increased flooding or reduced water supply.²⁴

Urban sprawl is the primary reason behind the loss of open space. Unprotected natural areas are particularly susceptible to urban sprawl because of the financial incentives landowners have to sell their land to developers. In contrast, landowners cannot always receive compensation for preserving the ecosystems in place, even

when their services are valuable to and desired by the community. Farmers and ranchers face a similar incentive to sell to developers. As residential and commercial areas expand into rural regions, property values often increase (depending on zoning), creating lucrative opportunities to sell natural and rural land. This expansion can also drive up property and estate taxes, often beyond the ability of a farmer, rancher, or landowner to pay. This pressure effectively forces the owner to sell their land, even if they would rather keep it in the family. During 1992-1997, 320 acres of farmland were taken out of production every hour.²⁵ Furthermore, 31 percent of the land converted from agriculture into urban uses was prime or unique farmland, which is an extremely valuable national asset.²⁶ Once converted to other uses, it is both difficult and expensive, if not impossible, to restore open spaces to healthy ecosystems and fertile farmland.

Urban sprawl and the loss of open space affect not only the coasts, where they are most pronounced, but also many agricultural and recreational areas in the interior of the U.S. The following case studies of Atlanta, Wyoming and Iowa illustrate the potential value of conservation easements to conserve and protect important lands. Atlanta offers a good example of the severe impacts that the loss of open space is having on the health and quality of life for local residents. The loss of open space in Wyoming is spurred by residential development and is a serious threat to the health of America’s national parks and public lands. Even in Iowa, where nearly all of the open space and natural areas have been converted to agriculture, the state still stands much to gain from strategic investments in conservation easements. Due to the degraded state of natural ecosystems in Iowa, these easements must contain provisions to either remove the land from production, allowing natural restoration, or to significantly reduce the environmental impact of existing agricultural practices.

Case studies: Applying conservation easements to Atlanta, Wyoming, and Iowa

These case studies illustrate the role conservation easements play in protecting open space under three different development pressure scenarios. Figure 3 lists values of ecosystem ben-

efits from previous studies in the U.S. that are roughly applicable for open space benefits in Atlanta, Wyoming, and Iowa. These values should not be added up to assess total ecosystem worth because the studies were conducted using different methods for different locations and are therefore not easily summarized. However they

serve as an illustration of the multiple ways in which conservation easements create a return on the investment for our economy. More often than not, the most treasured virtues of open space cannot be translated into dollars.

Figure 3. Examples of benefit values in 1996 \$'s/acre/year

Ecosystem	Service	Location of study	Year of study	Low Value	High Value
Forest	Carbon storage and sequestration	US ²⁷	2000	\$11	\$22
	Soil Formation	Global ²⁸	1996	\$26	\$26
	Waste Treatment	US and global ²⁹	2000, 1996	\$11	\$225
	Biological Control	Global ³⁰	1996	\$10	\$10
	Cultural	US ³¹	1990	\$11	\$11
	Air quality	Atlanta ³²	2001	\$230	\$230
	Stormwater control	Atlanta ³³	2001	\$420	\$420
	Recreation	US and Scotland ³⁴	1989, 1978	\$38	\$148
Grasslands/ Rangelands	Raw Materials (timber)	Global ³⁵	1992	\$64	\$64
	Carbon storage and sequestration	US central grasslands ³⁶	1994	\$17	\$17
	Water regulation	Southern High Plains US ³⁷	1992	\$7	\$7
	Erosion control	US central grasslands ³⁸	1992	\$74	\$74
	Soil formation	NE Colorado ³⁹	1994	\$3	\$3
	Waste Treatment	Global ⁴⁰	1994	\$225	\$225
	Pollination	Global ⁴¹	1994	\$65	\$65
	Biological control	Global ⁴²	1994	\$58	\$58
Wetlands	Food production	US grassland and shrubland states ⁴³	1992	\$147	\$147
	Disturbance Regulation	US ⁴⁴	2001	\$58	\$18,685
	Water Supply	US ⁴⁵	2001	\$77	\$38,960
	Waste Treatment	US ⁴⁶	1991, 1989	\$884	\$7,678
	Food Production	US ⁴⁷	2001	\$12	\$6,561
	Recreation	US, Australia ⁴⁸	1993	\$252	\$5,029
	Cultural	US ⁴⁹ 50	2001, 1978, 1970	\$1	\$4,561
	Habitat/Refugia	US ⁵¹ – Nebraska ⁵²	1992	\$111	\$4,951
Lakes/ Rivers	Total Ecosystem	US ⁵³ 54	1990, 1981	\$0	\$89,742
	Water Supply	US ⁵⁵	1986, 1971	\$569	\$10,360
	Waste Treatment	US ⁵⁶	1980	\$245	\$3,188
	Food Production	Global ⁵⁷	1996	\$106	\$106
	Recreation	US ⁵⁸	1996	\$594	\$594
Cropland	Total Ecosystem	US - Platt River in CO ⁵⁹	1999	\$59	\$226
	Scenic	US - near urban area ⁶⁰	1985	\$21	\$21
Undeveloped Land	Scenic	US - near urban area ⁶¹	1993	-\$62	\$159

Atlanta

Georgia's ecosystems are among the most threatened in the United States, primarily due to the rapid expansion of metropolitan regions such as Atlanta.⁶² As a whole, the counties encompassing the Atlanta metro area have increased in population by 32 percent in the 1990's, yet the growth has been largely concentrated in areas surrounding the city of Atlanta where the growth rate is 100 times that of the urban center.⁶³ During this time period, the metro region had doubled in size north to south from 65 miles to 110 miles.⁶⁴

The development patterns of Atlanta have brought new problems to the region, including more pollution and the decreased ability of ecosystems to absorb and treat harmful wastes and emissions. Residents of the Atlanta metro region are worried about the effects that urban sprawl is having on their environment. A recent survey by the University of Georgia and Valdosta State University researchers shows that 85 percent of Georgians said they would approve some limits on private property rights if they were necessary to protect the environment.⁶⁵

Forests are among the most valuable and most threatened ecosystem in Atlanta. In 1974, tree canopies covered over 50 percent of the land surface of the Atlanta metro area but were reduced to less than 25 percent by 1996.⁶⁶ The loss of tree cover is primarily due to development, which has dramatically altered the land cover over the last twenty years (see Figure 4 for satellite imagery). If current development patterns continue an additional 200,000 acres of tree cover, or virtually all of the intact forest remaining, will be lost by 2020.^{67 68}

Air pollution is worsening in Atlanta. Thirteen counties in the Atlanta metro area have not attained air quality standards mandated by the federal Clean Air Act and consequently have been denied \$600 million in federal funding for transportation assistance.⁶⁹ The decline in air quality is primarily due to the increase in cars, brought

about by both population growth and sprawl as people commute farther and farther to work without the benefit of a public transport system. The loss of forests in Atlanta are worsening this situation. These forests improve air quality by removing nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, particulate matter that is 10 microns or less, and help to offset carbon dioxide emissions resulting from increased automobile usage. In 1996, Atlanta's remaining trees stored an average of 8.3 million tons of carbon and sequestered an estimated 58,000 pounds per year.⁷⁰

Beyond air quality and climate change concerns, tree loss and increased pavement in the Atlanta metro area from 1974 -1996 resulted in a 33 percent increase in stormwater runoff (or about 591 million cubic feet of water). The cost to build stormwater retention ponds and other engineered systems to intercept this runoff will eventually cost \$1.18 billion.⁷¹

Rapid and unbalanced growth has also endangered the extensive system of natural waterways in the Atlanta region. The Chattahoochee River, supplying half of all Georgians and 70 percent of metro Atlanta residents with drinking water, has been named "the most endangered urban river" in America by American Rivers.⁷² Suburban development along the river has seriously threatened the river's water quality because of polluted runoff from urban development.⁷³ Overloaded sewer systems have collapsed and raw sewage has killed wildlife and made the river temporarily unusable for recreation and fishing.⁷⁴ Atlanta's drinking water intake systems are located near the junction of Peachtree Creek and the Chattahoochee, which is one of the least clean parts of the river due to new, urban development.⁷⁵

The Trust for Public Land, in partnership with many other conservation organizations, has launched a campaign to place conservation easements and acquire

land on strategic parcels of the Chattahoochee River to prevent further degradation of the river's ecosystems. The campaign aims to protect 180 miles of parkland along the river. These efforts will help to:

- Reduce rainwater-borne sediment, pesticides, septic-tank seepage, toxic metals and other “non-point” pollution;
- reduce water treatment costs;
- create regional park systems with hiking and bike trails, natural areas, and parks; and
- help curtail urban sprawl.⁷⁶

The protection of the Chattahoochee River has received broad support and in late 1999, Congress appropriated \$25 million for land acquisition along the river.⁷⁷ Additional funds for conservation easements could be instrumental in protecting other important open spaces, such as forests and wetlands, which are interlinked with the overall health of the greater Chattahoochee River ecosystem.

Figure 5 maps both the areas with the highest population growth

between 1990 and 2000 and areas with above average acreage of key riparian, wetland, and forest ecosystems. Several important trends are highlighted by Figure 5:

- Population growth is concentrated in the suburbs, away from the urban core.
- This population growth coincides with a loss of important ecosystems, especially in the northern suburbs.
- Areas of overlap are mainly at the outskirts of population growth.
- This overlap represent the most threatened ecosystems and is illustrative of where conservation easements will make the most dramatic impact on total ecosystem health.

If applied strategically, conservation easements could provide significant benefits to the water quality and supply, air quality, and sprawl control for the entire metro area. The result would be economic gains in terms of avoided infrastructure investments, higher property values, enhanced recreational opportunities, and a higher quality of life for Atlanta area residents.

ATLANTA, GEORGIA

Key endangered ecosystems: Forests, wetlands, and riparian areas

Main threat: Urban development

Returns on investments to protect key ecosystems and open spaces:

- *Improved air quality.* The forests in Atlanta remove about 19 million pounds of air pollutants each year, worth about \$47 million a year.¹
- *Avoided waste treatment costs.* To meet state sewer standards, the City of Atlanta is spending \$240 million to counter effects associated with the loss of tree canopy.²
- *Avoided water management costs.* The storm water retention capacity of the remaining forest is worth about \$2.36 billion, or about \$85.9 million a year.³
- *Higher property values.* Property values of homes with trees in the landscape are 5–20 percent higher in Atlanta than equivalent properties without trees.⁴

ATLANTA'S SPRAWL: THE STORY BEHIND THE MAP

Since 1990, metro Atlanta has doubled in size north to south, lost most of its forest cover, and now has 13 counties falling below standards mandated by the federal Clean Air Act. The Chattahoochee River, designated by American Rivers as the nation's most endangered urban river, provides water to most of the metro region and half of all Georgians. Drinking water intakes are located in one of the river's most polluted spots, owing to new urban development. An alliance of organizations, including the Trust for Public Land, is working to place conservation easements and acquire key parcels to prevent further degradation of the river's ecosystem. Applied strategically, conservation easements could make a major contribution to water quality and supply, air quality, and sprawl control for the entire metro area. The end result: lower infrastructure costs, higher property values, enhanced recreational opportunities, and a better quality of life for Atlanta area residents.

¹ American Forests, 2001.

² Trees Atlanta, 2002.

³ American Forests, 2001.

⁴ Trees Atlanta, 2002.

Figure 4: Landcover change in the Atlanta Metropolitan Area

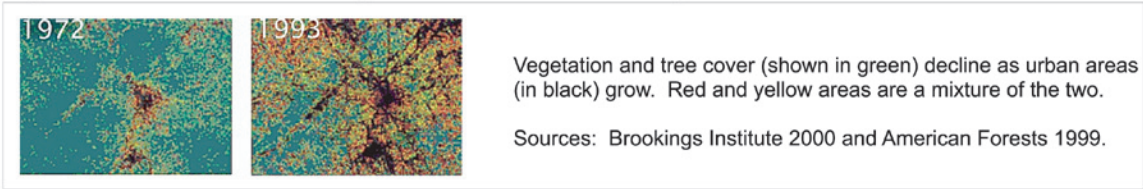
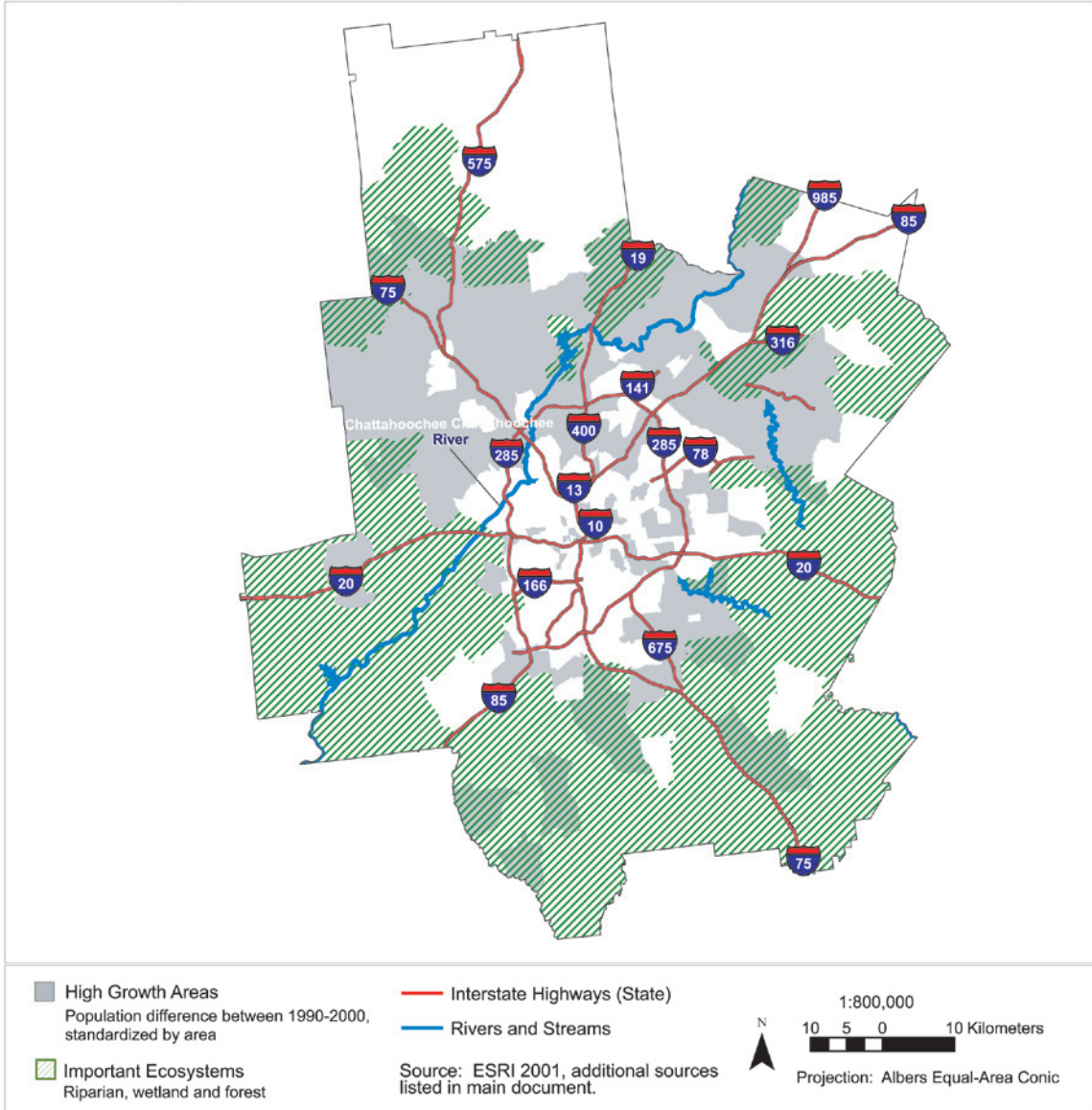


Figure 5: Population growth (in gray) threatens remaining important ecosystems (green stripes) in the Atlanta Metropolitan Area.



Wyoming

Wyoming is famous for its awe inspiring national parks and its “wide open” space tradition. However these institutions are at risk from increasing residential development that is dividing the once vast range and natural land into thousands of backyards. This subdivision disrupts the ecosystems of famous public lands, such as the Grand Tetons and Yellowstone National Park. It is also impacting the ranching community by introducing incentives for ranchers to sell their land while making it more difficult for those who want to keep their land to pay the increased taxes or to pass it on to the next generation because of estate taxes. Together the twenty counties that make up the Greater Yellowstone ecosystem grew an average of 14 percent a year in the 1990’s and today would be considered the fastest growing state in the country.⁷⁸ By 1991, more than a million acres in the Greater Yellowstone area had already been subdivided.⁷⁹

As land is subdivided, associated roads and human development often interrupts wildlife migration corridors, decreases habitat for rare plants and animals, and makes the management of ecosystems more difficult.⁸⁰ Land fragmentation is not the only problem facing the environment or farmers, but it is among the most pressing. Other important problems include weakened agricultural economies, damage to riparian areas from cattle grazing, conflicts between predators and livestock owners, and disease control between wild and livestock populations.

Private lands encompass 36 percent of the Greater Yellowstone ecosystem.⁸¹ Although the majority of land in Wyoming is public, the health of Wyoming’s public lands is tied to the fate and agricultural practices of the surrounding lands in private ownership. Lands taken for ranching or agriculture have certain characteristics that make them ecologically important as well, such as level terrain in valley bottoms, lower elevations, and water resources. For example, private lands encompass riparian corridors and

wetlands that contain most of the biological diversity in the western U.S. Eighty percent of Wyoming’s native animals rely on wetlands and sixty percent of wildlife species in public lands will not be able to survive if key riparian areas are lost or damaged.⁸² Riparian areas are the most productive part of Wyoming’s ecosystem yet they are historically the first areas to be converted to other uses or damaged by cattle grazing.

Wildlife needs the habitat found on private lands because many species depend on open areas for habitat, migratory routes, and wintering grounds. If current development trends continue in the Greater Yellowstone ecosystem, the carrying capacity for carnivores will be dramatically impacted. Wolverines could decline by 15.7 percent, wolves by 17.1 percent, and grizzly bears by 26.4 percent.⁸³ It is hard to imagine the Yellowstone area without these critical members of the natural community, yet they are the most vulnerable to land fragmentation that destroys their habitat.

The Nature Conservancy’s Red Canyon Ranch is an example of successful efforts to protect both ranching and environmental interests from development threats. The Red Canyon Ranch consists of almost 5,000 acres of deeded property and 30,000 acres of state and federal leases. This area supports six species of large game animals and a large trout population. What is unique about the ranch is that it is protecting biodiversity at the same time as raising economically viable livestock; an operation made possible by observing best environmental practices for ranching operations. This pattern of combining ecological objectives with ranching operations will be critical to saving the existence of both. It is often the case that ranches are the final barriers to residential development around public lands.

Teton County stands out as an important candidate for conservation easements that combine ranching and conservation objectives, as in the

Red Canyon Ranch example. As the fastest growing region in Wyoming, the population increased by 30 percent in the 1990's and is projected to continue growing until 2025.⁸⁴ The threat of residential development is extreme and is not predicted to slow anytime soon. In addition to population growth, the demographics of Teton County are shifting as wealthy individuals purchase private residences near the Jackson area. As a result, Teton is one of the most affluent counties in the state and country with an average per-capita income in 1994 of \$32,427 (compared to \$20,347 for Wyoming and \$21,696 for the U.S.). Per-capita income in the county increased 26 percent from 1985-1995, compared to the national average of 8.1 percent in that time period, as a result of the influx of recreational property owners. Meanwhile agriculture decreased 5.5 percent. In the last 30 years, Jackson Hole's population has grown 400 percent and approximately 40 percent of the valley's agricultural land has been lost to development.⁸⁵ The opportunity to protect the remaining open land still exists.

Teton County is also home to some of the most important ecosystems in the Greater Yellowstone area, which include habitat found on private lands. Each winter, 25 percent of the Jackson Hole moose population migrates into and through private lands south of the Grand Teton National Park in search of food and shelter and 33 percent of the area's mule deer winter on private lands.⁸⁶ According to the Wyoming Game and Fish Department, without the protection of key nesting sites on private lands, the region's bald eagle population could not sustain itself.⁸⁷

Conservation easements are an important tool that can be used to protect private lands in Teton County from subdivision and ensure future recreational revenues. In 1999, more than four million visitors traveled through Jackson Hole to enjoy the recreational benefits of the region's wilderness.⁸⁸ In 1995 over half a million

people visited the National Elk Refuge in Teton County, generating \$2,469,500 in revenues to the local economy.⁸⁹ Of this amount the majority (97 percent) came from recreational expenditures that are not consumptive, meaning that they do not degrade the environment (such as photography, hiking, and wildlife viewing). Moreover, for every \$1 that was spent to maintain the Refuge, \$3.20 was generated in revenues: this figure shows how natural areas and wildlife can create large returns on the investments for local communities.⁹⁰ Such revenues are dependent upon total ecosystem health. For example, the thousands of the elk seen on the National Elk Refuge each winter have to pass through private lands that are rapidly being developed on their way to the refuge.⁹¹ Without this migration corridor, the future of the National Elk Refuge is threatened.

Investments in conservation easements on critical private lands are necessary to protect the future of recreation on Wyoming's public lands. More than 10,000 acres of private land have already been protected in Teton County, yet over half of the County's private lands (about 35,000 acres) remain undeveloped, unprotected, and threatened by development.⁹² Figure 6 shows population increases on private lands between 1990 and 2000 contrasted with priority conservation areas as determined by the Greater Yellowstone Coalition, based on the degree of threat and irreplaceability concerns.⁹³ Population pressure is the primary reason behind land fragmentation and the subsequent destabilizing effects on ecosystem health. Figure 6 reveals several important trends:

- The amount of private land available is limited, confining population growth to a small percentage of the total land.
- The highest population growth is concentrated on the borders of recreational public lands.

- The majority of agricultural areas occur near important riparian ecosystems.
- There is a high overlap between priority conservation areas and private lands experiencing population growth.
- Very few of the most critical private lands are currently under conservation easements.

From figure 6 it is apparent that private lands are in important ecosystems and are experiencing high population growth. As a result, the potential for conservation easements to make a dramatic impact on the overall health of the Greater Yellowstone Area is great. The widespread and strategic application of conservation easements and sustainable ranching in this area will help to ensure the future of our public lands, along with the local economies and cultural heritage they support.

STATE OF WYOMING

Key endangered ecosystems: Wetlands, riparian, and valley areas near public lands

Main threat: Fragmentation of land by residential development

Returns on investments to protect key ecosystems and open spaces:

- *Investment in public lands is protected.* 80 percent of Wyoming's native animals rely on wetlands. 60 percent of wildlife species in public lands will not be able to survive if riparian areas are lost or damaged.¹
- *Future recreation and tourism revenues are protected.* In 1992, non-consumptive use of wildlife (observation, photography, nature study, etc.) generated \$255 million for Wyoming.²
- *Agricultural and ranching legacy is preserved.* Open space and agricultural lands are highly valued (even by non-agricultural and non-rural residents) because they help to define the character of the region, or "wide open space".

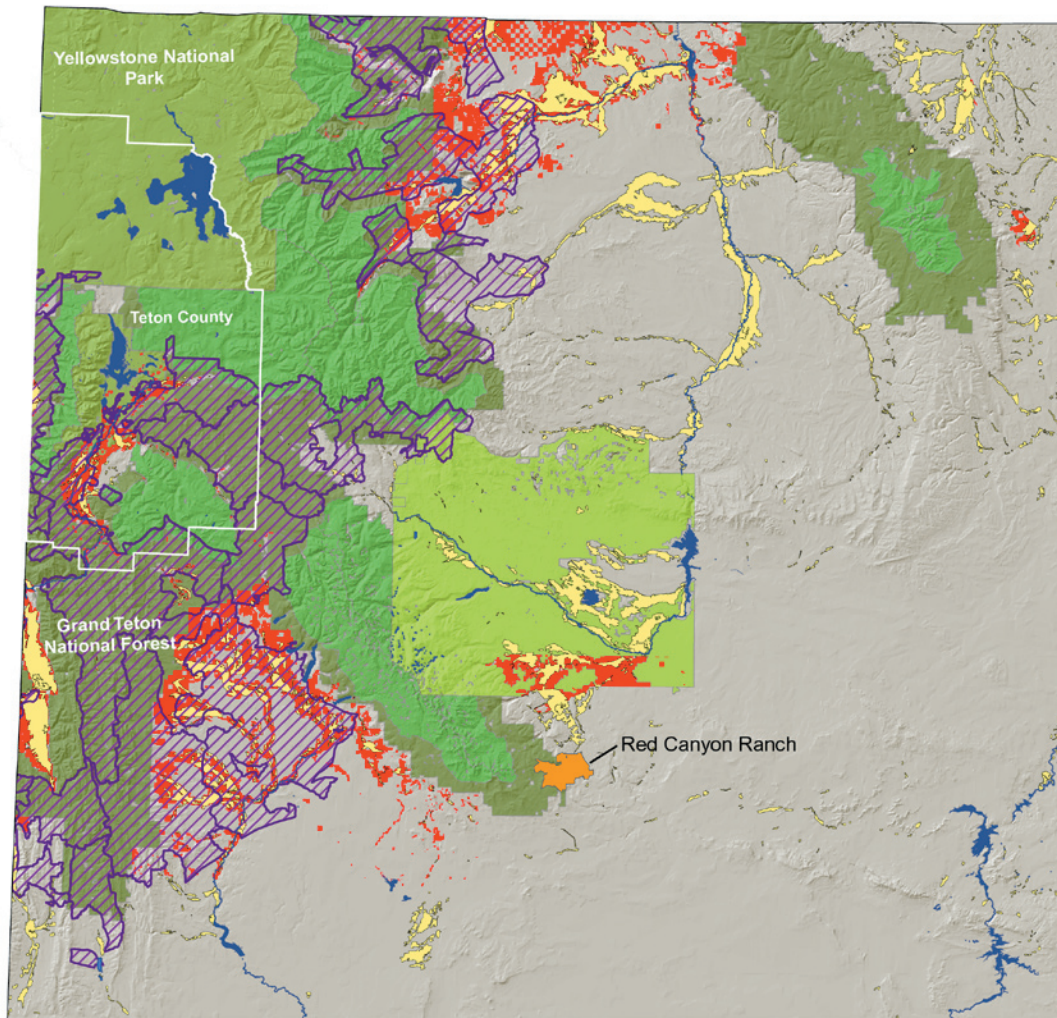
LAND FRAGMENTATION IN WYOMING: THE STORY BEHIND THE MAP

By 1991, more than a million acres in Wyoming's Greater Yellowstone area had already been subdivided; in the decade to follow, the 20 counties that constitute its ecosystem grew by 14 percent. This fragmentation disrupts the ecosystems of the Grand Tetons and Yellowstone Park, as well as contributing to the demise of ranches and farms and the wildlife living there. Recreation and tourism is threatened too. In 1995 over half a million people visited the National Elk Refuge in Teton County, generating nearly \$2.5 million in revenues for the local economy from just one recreational area. The Nature Conservancy's 35,000-acre Red Canyon Ranch — supporting six species of large game animals and a robust trout population — shows how conservation easements can protect both ranching and environmental interests from development threats.

¹ Consolo-Murphy and Murphy, 1999.

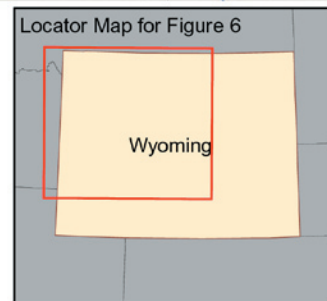
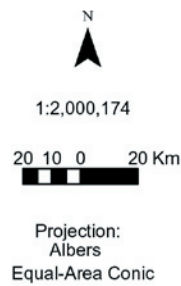
² Greater Yellowstone Coalition, 2001.

Figure 6: Population growth on private lands (in red) threatens important ecosystems and agriculture (in yellow) in the Greater Yellowstone Area



- | | |
|-----------------------|---|
| Agriculture | Privately-Owned High Growth Areas
Population difference between 1990 and 2000 standardized by area. |
| National Forest | High priority conservation zone
Determined by the Greater Yellowstone Coalition based on threat and irreplaceability |
| National Park | |
| Native American Lands | |
| Designated Wilderness | |
| Major water body | Red Canyon Ranch |

Sources: ESRI 2001, GYC 2001, USGS 1997, WWF-CBI 2001, WWRC 1998, Wyoming GAP 1996.



Iowa

In comparison to the rest of the U.S., Iowa has a low rate of population growth, slow development, and few urban centers. Nonetheless, Iowa is among the most degraded states in terms of ecosystem health. Iowa has lost nearly all of its native biodiversity and has hundreds of state listed endangered species. Extensive agricultural development (covering 93 percent of Iowa's land) has resulted in the loss of most of the original tallgrass prairie, wetlands, and forests.⁹⁴ While the majority of this development occurred over a hundred years ago, well before public conservation awareness began to take hold in the U.S., the current reality is that very little of the original ecosystems have survived. Efforts to restore agricultural lands to their natural state would yield very large ecosystem service benefits, particularly in riparian areas.

- Iowa's native ecosystems are in a devastated state:
- Only five percent of Iowa's original ecosystems remain intact.
- Wetlands have been decreased by 89 percent.⁹⁵
- Draining has reduced fens by between 65 to 77 percent. Fens, which are small, boggy spring-fed wetlands, are species-rich containing 200 of Iowa's 1,500 plant species, including many that are officially endangered, threatened or of special concern.
- Only 0.1 percent of the tallgrass prairie, which previously embodied the character of the state, remains.
- When lumping all types of prairie together, less than 5 percent remains, or less than 10,000 acres.
- Forests originally covered between 12-19 percent of the land but now cover about 4 percent. An additional 6,900 acres are lost each year. At one time Iowa's prairies supported an abundance of bison, elk and waterfowl, yet today agriculture

has deprived most wildlife of its habitat. Seventy original species have been lost from the state, including the wolf, mountain lion, bison, elk, and the trumpeter swan, and more than 200 plants and animals are on the state list of threatened and endangered species.⁹⁶ Iowa state agencies and conservation groups are trying to preserve what little parcels of wild habitat remain, as well as to set aside and allow restoration of destroyed or degraded sites. Because 92 percent of the land in Iowa is privately owned, conservation easements are an important tool to protect remaining natural areas from development.⁹⁷ For example, the Iowa Prairie Pothole Joint Venture acquired conservation easements on 353 acres of wetlands in 1993. Furthermore landowners pay no property taxes on lands where they are maintaining forests, native prairie, wetland, or other wildlife habitat, yet this policy does not protect them from the pressures of urban development in areas near cities.⁹⁸ Unfortunately these conservation efforts are dwarfed in comparison to the extensive damage that has already been done. Much more ambitious conservation efforts will be necessary to decrease the acreage of imperiled ecosystems and numbers of endangered species to levels where they can be considered secure.

Figure 7 shows areas of highest population growth and important remaining ecosystem areas, such as riparian, wetlands, and forest while Figure 8 takes a closer look at protected and unprotected natural areas in the greater Des Moines region. These maps illustrate the following points:

- Agriculture accounts for nearly all land use in Iowa.
- Very few important ecosystems remain intact.
- Of the remaining important ecosystems, some are located near areas of population growth, indicating that they are at risk from future development pressures.

- Most of the few ecosystems that remain intact are those that have been intentionally protected, especially as seen in the Des Moines area.

Wide-scale use of conservation easements would allow Iowa to conserve its few remaining unprotected intact ecosystems. While this is critically important, many additional benefits could be realized by using conservation easements as a means to allow landowners to retire and restore land or farm in ways that are supportive of, and compatible with, natural systems. Through the use of conservation easements, Iowa can

acquire rights that will protect and extend extraordinarily valuable riparian corridors from continuing agricultural development, as well as to conserve other acreage for important habitat and broader natural services. These strategic acquisitions, entered into voluntarily with the landowner, will significantly increase the value of the land in terms of ecosystem services and will greatly improve the overall ecosystem health of the state. Because of this, Iowa stands out as a case where there is great potential through the use of conservation easements to improve its long-term ecosystem health.

STATE OF IOWA

Key endangered ecosystems: All native ecosystems, including wetlands, riparian areas, prairie, and forests.

Main threat: Agricultural land use practices that are not supportive of, and compatible with, Iowa's ecosystem health.

Returns on investments to protect key ecosystems and open spaces:

While the most immediate priority may be to conserve the little natural habitat that remains, further gains can be realized by removing agricultural production through the use of conservation easements, particularly in riparian corridors. Setting aside agricultural land and allowing it to be restored to its natural state has been shown to have the following benefits for surrounding communities:

- *Agricultural amenities.* Benefits to farmers include erosion control, nutrient management, and water supply stabilization.
- *Cost savings on public works.* Benefits to the public include reduced maintenance on roadside ditches, irrigation infrastructure, water treatment facilities, flood damage, and water storage.
- *Health impacts.* Benefits from air quality improvements from reduced pesticide use and increased ability of natural land to absorb nutrient and pesticide contaminants.
- *Recreational.* Improved fish and wildlife habitat supports recreational activities, such as hiking, hunting, fishing, and birdwatching.

ECOSYSTEM DEGRADATION IN IOWA: THE STORY BEHIND THE MAP

Over the past hundred or more years, tall grass prairie, wetlands, and forests have given way to agriculture across nearly the entire state of Iowa. More than 200 plants and animals are on its list of threatened and endangered species. With 92 percent of its property privately owned, the state stands much to gain from the strategic use of conservation easements to restore its ecosystem health.

Figure 7: Few valuable ecosystems (in green stripes) remain in Iowa. Population growth is limited to small areas while agriculture accounts for the majority of the land use.

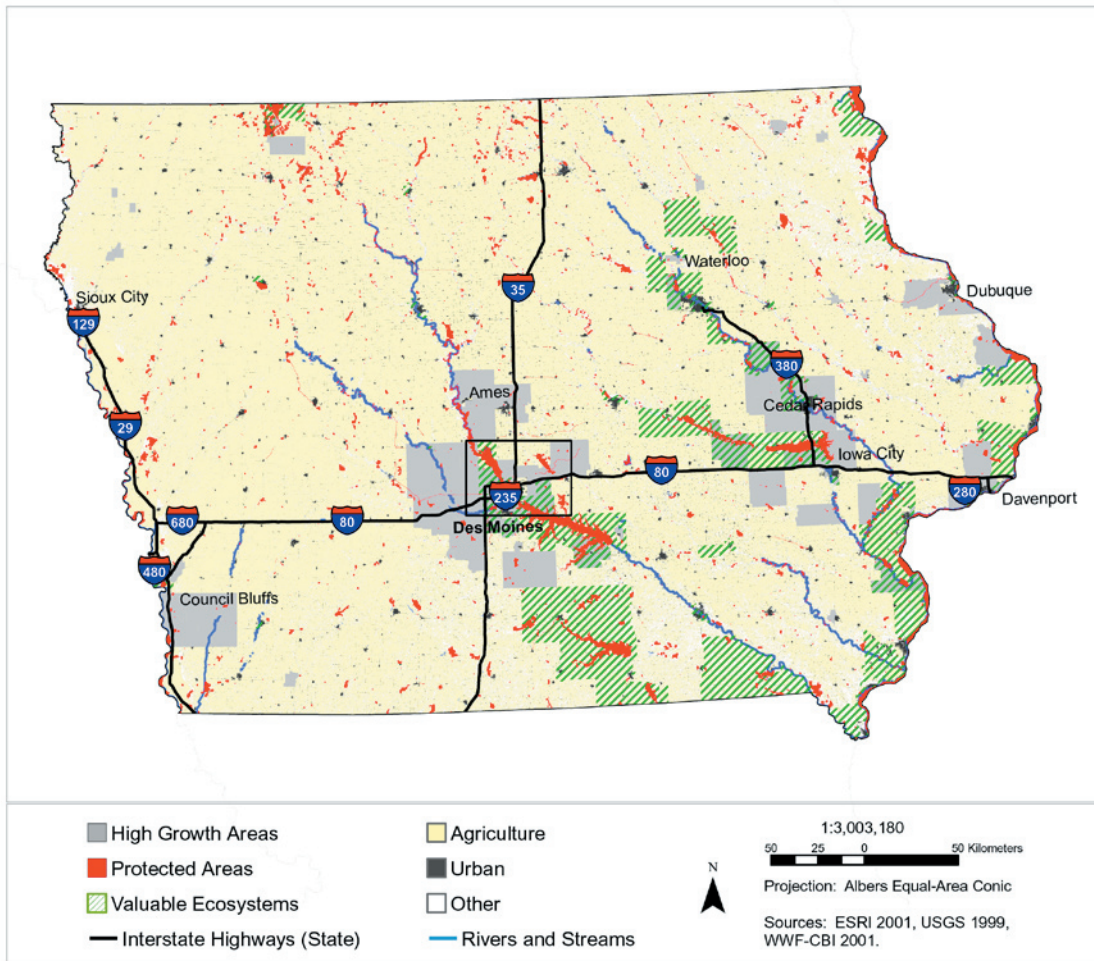
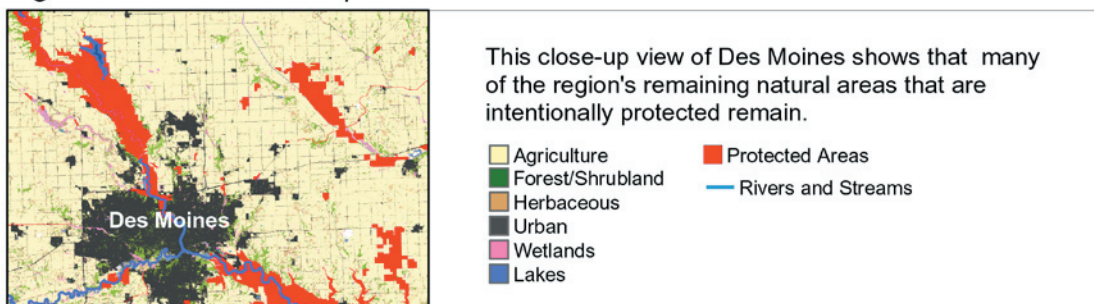


Figure 8: Land cover and protected areas around Des Moines



Conclusions

Open space is critically important to America and is disappearing at an alarming rate. The majority of America's open spaces are privately owned, meaning to save them we must provide the right incentives for landowners to consider conservation over development. Conservation easements are a legal means to provide this incentive and have already been used successfully on a limited scale in many parts of the country. However the current policies do not provide enough support for many farmers and ranchers to place conservation easements on their land. Since open space provides many important public benefits, it is in the best interest of both local and national governments to create incentives and alternatives to land development.

To be effective, conservation easements must be applied strategically

with regard to local development threats, whether commercial or agricultural, and with regard to characteristics of existing open spaces. Contiguous properties that are vital to total ecosystem health are more valuable investments than isolated parcels that do not contribute to the overall functionality of the greater ecosystem. Furthermore, existing riparian zones and wetlands, or those that can be restored to these habitat types, should be the highest priority targets for conservation easements because they provide the most benefits in terms of ecosystem services. Conservation easements are an important tool to protect natural ecosystems while keeping land in private hands, creating a win-win situation for all stakeholders involved.

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World Resources Institute

World Resources Institute (WRI) is an environmental think tank that goes beyond research to find practical ways to protect the earth and improve people's lives. Its mission is to move human society to live in ways that protect the Earth's environment and its capacity to provide for the needs and aspirations of current and future generations.

Because people are inspired by ideas, empowered by knowledge, and moved to change by greater understanding, WRI provides -- and helps other institutions provide -- objective information and practical proposals for policy and institutional change that will foster environmentally sound, socially equitable development. Headquarters in Washington, D.C., its web site maybe found through www.wri.org.

West Hill Foundation for Nature, Inc.

The West Hill Foundation for Nature, Inc. is a 501(c)(3) organization dedicated to conserving this Nation's flora and fauna and the ecosystems that support them. The Foundation is located in Jackson, Wyoming.

Carl W. Knobloch, Jr. is Chairman of its Board. Mr. Knobloch has created, managed and operated a diverse range of businesses over his career, including serving as Chairman and CEO of Production Operators, Inc., in Houston, Texas, as well as currently serving as chairman of Automated Logic, Inc. in Atlanta, Georgia. In addition to his business career, Mr. Knobloch has been significantly involved in many civic organizations throughout the United States.

Christopher Glenn Sawyer serves as President of the Foundation. He is currently a Senior Partner with the law firm of Alston & Bird in Atlanta, Georgia; is completing his sixth year as Chairman of the National Board of Directors of the Trust for Public Land in San Francisco; and currently also serves on the Boards of IDI, EDAW and the Urban Land Institute.

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