



Assessing the Wealth of Nature

Using Economic Studies to Promote Land Conservation Instead of Sprawl

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As the pace of exurban land development has accelerated, landowners and developers have profited considerably by converting natural habitat to residential and commercial developments. Yet many communities sense that they are losing valuable assets as these changes take place. In fact, natural, undeveloped lands on urban outskirts can provide numerous public benefits. They can help conserve biodiversity by preserving critical habitat for native flora and fauna. They can help purify surface and groundwater, improve air quality, and keep the region cooler in summer. Natural areas can also provide places for recreation and offer aesthetic views and a sense of serenity often lost in city developments.

Demonstrating the economic value of preserving these undeveloped and natural areas can be an important tool in building support for such conservation—and therefore can play an important role in city and regional planning. But because many of the public benefits these lands provide cannot be assessed in the same way as private market transactions, such evaluations can be difficult. Therefore, economists have developed specific methods for measuring these economic values. They include, for example, analyzing how property values may be affected by proximity to natural areas and using surveys to gauge residents' willingness to pay for conservation.

To understand what work has been done in this field thus far and to provide a starting point for additional assessments, Resources for the Future, in collaboration with Defenders of Wildlife and Island Press, conducted an inventory of studies that evaluated the benefits of preserving undeveloped lands on urban outskirts and the role such economic analyses have played in land use plans—particularly with a view to biodiversity conservation. This inventory is detailed in *Public Benefits of Undeveloped Lands on Urban Outskirts: Non-Market Valuation Studies and Their Role in Land Use Plans*, a white paper by H. Spencer Banzhaf and Puja Jawahar of Resources for the Future available at <http://www.defenders.org/assessingwealth>.

The inventory showed that although assessing and communicating the economic benefits of natural habitat conservation is still a developing field, there are examples of economic studies successfully influencing local land use planning and conservation decisions. These success stories, as well as guidelines and methodologies for conducting sound economic studies, were highlighted in the white paper and are summarized here.



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Success Stories

Northeast Florida

Defenders of Wildlife commissioned a study by economists at the University of Florida on the economic benefits of natural lands in northeast Florida, including the Jacksonville area. By applying the results of economic benefits studies in other parts of Florida and throughout the United States, the economists estimated that these natural areas provided benefits—from agricultural activities, recreation-related activities and aesthetic amenities—worth approximately \$2.6 billion per year. A follow-up study by economists at Defenders of Wildlife concluded that the ecosystem services, such as water regulation, water supply and habitat, provided by the natural areas are worth \$3.2 billion per year.

Defenders of Wildlife presented the results of these economic studies in *Investing in Nature*, a shorter, simplified report. To complement this report, Defenders also produced a CD featuring excerpts from interviews with community leaders from economic development, real estate, political

and other sectors, and a PowerPoint for presentation to general audiences. This report package was distributed throughout the state to local planners and planning commissions, to state legislators and to conservation activists and other members of the public. Besides educating those audiences and raising the profile of this subject overall, *Investing in Nature* and the underlying research also contributed to a provision in an important growth management act passed by the Florida legislature in 2005. The provision encourages local governments to review the benefits of all land uses for any proposed new development outside the urban service boundary. Defenders of Wildlife obtained a commitment from the bill's sponsor to make the economic value of conservation lands a subject for study. *Investing in Nature* continues to be used to advocate for local and state land conservation.

Routt County, Colorado

In Routt County—home of Steamboat Springs—the primary industry is tourism, and residents value natural areas (including ranchlands) for their wildlife habitat, aesthetic values and recreational opportunities. Yet the area lost approximately 20 percent of its valley ranchland to development between 1990 and 1995. To quantify the value that residents and tourists place on natural areas, economists conducted two studies for each group—residents and tourists. They found that each resident was willing to pay between \$36 and \$72 to protect 25 percent of existing ranchland in specific valleys, and \$107 to protect 25 percent of the ranchland in the whole county. This came to only about \$50 per acre—not enough to justify large purchases on benefit-cost grounds. The study of tourists estimated how much tourists would be willing to pay for trips to the area and how their travel patterns would change if all the open ranchlands were developed, including by tourist-related development. The study found that the vast majority of tourists considered the ranchlands' aesthetic contribution to be an important part of their visits and that tourism would decline if ranchlands were lost.

Together, the studies' results were interpreted to indicate support for conservation. These studies were shared with the community and policymakers via a bulletin circulated among stakeholders, a public workshop, meetings with land trusts and other stakeholders and the county's annual economic summit. The studies influenced new land use planning rules that encouraged the clustering of housing in new developments in ways that preserve natural areas. In 1997, county citizens approved a purchase of development rights program through a tax that averaged \$20 per property

per year. Recently, a follow-up economic study was commissioned to establish a basis for the continued justification of the program.

Prosperity in the 21st Century West

In 2004, the Sonoran Institute published a report, *Prosperity in the 21st Century West*, which examined the economic impact of protected public lands on western U.S. communities. Using data on economic variables, the report found that although the historic impetus for growth in the West was resource extraction and agriculture, in recent years the region's economy has become increasingly dominated by the service sector and sustained by amenities provided by protected public lands. However, the report found that the benefits of protected public lands varied depending on access

to transportation, presence of an educated workforce and historic economic reliance on natural resource extraction.

The Sonoran Institute condensed the original technical report into a shorter version disseminated to policy makers, conservation groups, public land managers and the news media. The Sonoran Institute's successful outreach effort was accompanied by training workshops and the development of an economic profile system that other western communities could adapt to create their own socioeconomic profiles. Thus the report and its methodology led to a template that local communities are using as a part of their conservation strategies.

Guidelines for Future Studies

Conservationists are becoming increasingly interested in undertaking studies such as the ones described above to influence community land conservation and land use planning. Before undertaking such a study, however, the following guidelines should be considered.

Find out what other studies have been done.

A good starting place is the Resources for the Future white paper at <http://www.defenders.org/assessingwealth>. Defenders of Wildlife also has a bibliography of economic valuation literature useful for locating such studies.



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Residents value undeveloped lands primarily for their wildlife habitat and water quality protection.

In recent years, it has become clear that there is substantial—and growing—support for protecting undeveloped lands. From 2001 to 2005, residents of some 40 states considered more than 850 state, county or municipal ballot measures supporting conservation of natural areas and undeveloped lands. About 74 percent of these measures were successfully adopted, authorizing total funding of more than \$14 billion.

Residents of urban and suburban communities throughout the United States consistently cite environmental benefits as the primary reasons they value these undeveloped lands. Of the environmental benefits provided by these natural areas, wildlife habitat conservation and water quality protection rank highest in surveys, followed by growth management, farmland preservation, aesthetics and recreational opportunities.

Surveys have also found that residents understand that undeveloped natural areas have greater ecological value than do urban open spaces and working farmland, especially for biodiversity conservation. Understanding residents' priorities for preserving undeveloped natural areas provides a foundation for assessing the economic value of the public benefits of these lands.

In some cases, previous studies can be used to illustrate the value of natural areas; new community-specific studies are not necessary. For example, the Coalition for Sonoran Desert Protection commissioned a 2002 report, *Economic Benefits of Protecting Natural Resources in the Sonoran Desert*. The report used research from previous environmental benefits studies done in the Southwest to illustrate the economic values associated with natural lands in Pima County, Arizona (an area that includes Tucson). It concluded that conservation of the Sonoran Desert would yield substantial economic benefits and therefore merited consideration in policymaking.

The coalition report was influential in the campaign to sway public opinion in favor of the Sonoran Desert Conservation Plan. The report was available online, and coalition members also presented it to policymakers, newspaper editors and local news media. In May 2004, Pima County passed a



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referendum in favor of a land conservation program with a 67 percent majority. In addition to promoting passage of the referendum, the report helped steer the program's protection efforts toward ecologically sensitive lands.



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Team with economists and broadcast results.

The examples described above and others included in the Resources for the Future inventory, often involved a collaboration between economists, who conducted a study or literature review, and conservationists, who communicated the results to policymakers. As with any advocacy effort, conservationists should formulate an outreach strategy, identify audiences and secure a communications budget early on—before commissioning an economic study.

Use methods that suit your needs and resources.

The variety of methods that economists use to estimate the value of public benefits of natural lands are briefly described below. Each has advantages and disadvantages with respect to the cost of the study and its appeal to target audiences.

- **Stated preference studies** determine residents' willingness to pay for various benefits and services by using surveys presenting hypothetical scenarios. These scenarios typically describe an environmental problem, offer a hypothetical solution and explain that this solution must be paid for in a specific way (e.g. with taxes or fees). In the simplest form of stated preference, respondents are asked how willing they are to pay for such a program or to cast a vote for or against the program in response to a specific fee. A "yes" vote implies a willingness to pay at least that much for the environmental improvement described in the scenario. In an alternative form of stated preference, respondents choose among sets of alternative policies that differ qualitatively and/or quantitatively in their results and in their cost.

Because they use hypothetical scenarios, stated preference studies may not always reflect how residents will respond to actual situations. Yet they can provide information about residents' overall values, even in cases where they would be willing to pay just for the sake of conservation or to secure benefits that would be enjoyed by other people in present and future generations. These studies can also provide a range of qualitative information about community members' attitudes and support for programs. Therefore, stated preference studies are one of the best ways to assess how residents value the ecological benefits of protecting natural areas on urban outskirts.

- **Property value studies** involve analyzing the relationship between local property values and nearby or adjacent undeveloped lands and the amenities they provide—including improved water and air quality, aesthetics and recreational opportunities. Such property



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areas for recreation. In their review, Resources for the Future did not find any travel cost studies that had been used to influence land use plans for urban outskirts. Rather, these studies tended to focus on large, more distant protected areas (such as national parks and national wildlife refuges).

- **Cost avoidance studies** assess the savings gained by avoiding costs associated with environmental degradation. For example, to protect its drinking

water quality, New York City opted to preserve land with water sources in the Catskill Mountains instead of installing expensive water filtration plants. If water quality degradation were to occur, the filtration plants would have been legally required, so significant resources were saved by spending less money to preserve the land. While avoiding degradation is a real value, simply evaluating costs avoided by not causing harm does not truly measure the value of the benefits provided by undeveloped natural areas.

- **Applied results studies** use the results of previous studies—the values estimated using one of the methods described above—in a different context. (Economists call this the benefit transfer method.) For example, to estimate the value of a particular forest, researchers might apply the results from a stated preference study of a forest in another part of the state or country. Such studies require deciding which existing information best fits the case under consideration and thus may be more subjective than those using other methods.

By arming themselves with good economic studies and communicating the results effectively, conservationists can show leaders and decision-makers that land conservation is good fiscal policy. For a summary of specific studies and how conservation groups and local communities used them in their efforts to promote land conservation instead of sprawl, see the table on the following pages.

value studies are an example of what economists call a “revealed” preference, as values are reflected by actual market transactions. This is their main strength. But property values will only reflect the ecological value of these benefits if they are

obtained by owning property nearby. The value of a nice view or convenient access to recreation facilities are examples. The presence of wildlife, on the other hand, which one may value even if it is not nearby, may not be reflected in property values. Moreover, property values will only reflect the ecological value of these benefits if residents are aware of and connect environmental attributes to personal and property benefits.

Overall, the property values studies reviewed showed that while land conservation generally increases property values, this cannot be guaranteed. Given the many variables entailed, these studies, while of great interest academically, have been used less frequently in policy-making than stated preference studies.

- **Travel cost studies** measure economic value by calculating how far people are willing to travel to use natural

Summary of Studies and Policy Outcomes

For a complete list of citations, including the studies here, see the original paper by Resources for the Future, at www.defenders.org/assessingwealth.

Study	Region	Method	Value	Communication/Outreach and Outcomes
WEST				
Breffle, Morey and Lodder (1998)	Boulder, Colorado	Stated preference	To preserve a 5.5-acre parcel of land, households were willing to pay a one-time fee of \$302, a total neighborhood-wide sum of about \$774,000.	The report was sent to the city council and mayor of Boulder, and all plans for a housing development were dropped. The developer finally sold the land to a buyer planning to build a single home. Unfortunately, the completed home sprawled over the land and restricted views.
Loomis, Traynor and Brown (1999)	Loveland, Colorado	Stated preference	Willingness-to-pay for recreation and natural areas varied from \$32 to \$116 depending on survey and methodology.	The study was presented to a local land commission, which used it to design a ballot initiative executed in 2003. The initiative was not adopted.
Rosenberger and Walsh (1997)	Yampa River Valley, Routt County, Colorado	Stated preference	The average annual household willingness to pay to protect 25% of specific valleys was \$36 to \$72 and \$107 to protect 25% of the entire county—about \$8 per thousand acres.	A special extension bulletin was circulated among stakeholders. A public workshop was held, along with meetings with land trusts. The study was also presented at the county's annual economic summit. The report was referenced in new land use planning rules (open lands plan). In 1997, citizens approved a tax of \$20/person/year for a purchase of development rights program.
Riddel (2001)	Boulder, Colorado	Property values	Purchasing 15,000 acres of open space between 1981 and 1995 increased housing prices by an average of about 3.75% or \$10,125 for the median-priced home.	None
Rosenberger and Loomis (1999)	Steamboat Springs, Routt County, Colorado	Travel cost and stated preference	A stated preference study of summer visitors found that failing to preserve ranchland would reduce visits, but converting open space to tourist infrastructure would attract visits, hence there was no net value of preserving ranchland. A separate travel cost study found that trips would decline if ranchland were lost.	Together the studies influenced new Routt County land-use planning rules that encourage the clustering of housing in new developments in ways that preserve natural areas.
McPhearson (1992)	Tucson, Arizona	Applied results studies (Urban Ecological Analysis)	The tree cover gained by planting 500,000 trees between 1990 and 1996 would provide average annual benefits of \$25.09 per tree for cooling savings and dust and runoff reduction, compared to average annual costs of \$9.61 per tree.	The study was shared with various stakeholders via the county extension office. See Rosenberger and Walsh (1997) for outcomes.
Mahan et al., (2000)	Portland, Oregon	Property values	Proximity to wetlands had a positive effect on prices. A 1,000-foot decrease in distance to wetlands increased values by \$436. Respective proximity to a stream or lake increased values by \$259 and \$1,644.	Not known
Wu and Cho (2003)	Portland, Oregon	Property values	Rural lands and wetlands all had positive values in the model.	Not known
MIDWEST				
Kosobod (1998)	Chicago, Illinois	Stated preference	Residents of the Chicago metropolitan area were willing to pay between \$39 and \$59 million per year for an unspecified amount of additional wilderness.	Not known
Krieger (2004)	Petoskey, Michigan	Stated preference	About 65% of the households supported a property tax increase to fund an easement program at a cost of \$4 per year, and about 50% at a cost of \$104 per year. Results were not sensitive to the scope of land protected.	Commissioned by area Land Conservancy Task Force. The results were presented at a public meeting. Despite initial interest, the program has stalled.

Study	Region	Method	Value	Communication/Outreach and Outcomes
Krieger (1999)	Kane, McHenry and DeKalb counties, Illinois	Stated preference	To protect 20,272 acres of farmland, the mean willingness-to-pay per household was \$484 annually for 5 years. Median willingness to pay was \$100 to \$170.	Commissioned by the American Farmland Trust's Center for Agriculture in the Environment as part of ongoing research on sprawl in Chicago, the study was released at a large press conference. The trust has used the study to lobby local county boards, and it won the opportunity to place a purchase of development rights program on the ballot.
Roe, Irwin and Morrow-Jones (2004)	Franklin County, Ohio	Stated preference - multiple scenarios	10% increase in amount of farmland preserved increased housing prices by 3% to 6%, or \$394/year for poorer families to \$1,146/year for richer families.	None
Thorsnes (2002)	Grand Rapids, Michigan	Property values	Lots bordering preserved forests sold for a premium of 19 to 35% (\$5,800 to \$8,400). Lots adjacent to unreserved forests did not sell for as much of a premium.	Not known
McPhearson (1997)	Chicago, Illinois	Applied results studies (Urban Ecological Analysis)	Increasing tree cover by 10% reduced annual heating and cooling costs by \$50 to \$90 per dwelling. Net present value of a single tree was estimated at \$402.	The method has been adopted by American Forests, which has created profiles of ecological benefits of tree cover and greenery for several cities. This information has not been explicitly used to encourage land conservation policies, but it has been used to encourage tree planting drives and reforestation programs in several cities.
NORTHEAST				
Kaoru (1993)	Martha's Vineyard, Massachusetts	Stated preference	Residents willing to pay \$131 on average to protect island tidal ponds, motivated primarily by protecting ecological benefits.	Informally passed to local managers.
Earnhart (2001)	Fairfield, Connecticut	Property value and stated preference	Various natural features increased housing values, with land-based amenities more important than water-based amenities. Adjacent forest increased the median property value by 13.6%; restoring a marsh increased it by 2.7%.	Not known
Acharya and Bennett (2001)	New Haven County, Connecticut	Property values	Nearby natural areas increase property values, especially in more urban settings, but diversity in nearby land uses apparently does not.	Not known
Geoghegan (2002), (2003)	Calvert, Howard and Carroll counties, Maryland	Property values	The 2002 study found that nearby natural areas increased property values, with nearby protected lands bringing 3 times more value than unprotected lands. The 2003 study results were more mixed.	Not known
Irwin (2002)	Anne Arundel and Howard counties, Maryland	Property values	Converting 1 acre of developable pasture land to privately owned conservation land increased property values by \$3,307; to publicly owned non-military land: \$994; to low density residential use: -\$1,530; to commercial/industrial use: -\$4,450; and to forested land: -\$1,424.	None

Study	Region	Method	Value	Communication/Outreach and Outcomes
SOUTHEAST				
Ready, Berger and Blomquist (1997)	Kentucky	Property values and stated preference	A property values study found a Kentucky household would be willing to pay \$0.43 annually to prevent the loss of a single horse farm. A stated preference survey found that residents would pay \$0.49 to prevent the loss of one farm. They were willing to pay \$0.63, \$1.02 and \$3.36 to prevent the loss of 10, 25 and 50 percent of horse farms, respectively.	Not known
Smith, Poulos and Kim (2002)	Research Triangle Area, North Carolina	Property values	Mixed to negative effects of undeveloped lands on nearby housing prices, including publicly protected lands.	Results were communicated to local transportation planners but were not aggressively used to shape policy.
Walsh (2004)	Wake County, North Carolina	Property values	Green space was valuable in urban areas, but was a disamenity in ex-urban areas.	None
Kiker and Hodges (2005)	Duval, Clay, Putnam, and St. Johns counties, Florida	Applied results studies plus agricultural and tourist income study	Total estimated value of natural resources: \$2.6 billion/year.	Commissioned by Defenders of Wildlife and repackaged in a popular report. Has helped shape a state growth management bill to require benefit analyses of current land uses when changing zoning outside urban service boundaries.
Kroeger (2005)	Duval, Clay, Putnam, and St. Johns counties, Florida	Applied results studies	Transferred ecosystem values estimated by Costanza et al. (1997), for a total value of \$3.2 billion/year.	Commissioned by Defenders of Wildlife and part of broader effort described under Kiker and Hodges (2005).

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