

The Value of Farm and Forest Preservation in Connecticut

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Executive Summary

This report describes results of the **2005 Connecticut Land Preservation Survey**. This survey was a carefully designed choice experiment which assessed the amount that Connecticut residents would be willing to pay in taxes and associated fees to preserve farm or forest land in Connecticut. Survey results quantify the value that Connecticut residents have for different types of farm and forest preservation. Results indicate that the value of farm and forest preservation can be substantial, and can vary widely depending on the kind of land under consideration, the method used to prevent development, and the risk of future development on unpreserved parcels. When considering additional preservation in the range of 5,000 to 10,000 acres, the average statewide value per acre of preserved farm or forest in Connecticut is \$6,595 per year, or \$109,914 in total capitalized value.¹ This value reflects the benefits that Connecticut residents derive from the preservation of undeveloped land in the state. Benefits of farmland preservation are composed mainly of residents' non-market values for amenities such as recreational access, scenic vistas, and community character. These values are **not** captured in prices paid for farm and forest land in market transactions. As a result, market prices underestimate the true value of farm and forest to Connecticut residents.

¹ Total present value over all future time periods.

The Character of Connecticut

Connecticut displays a rich diversity in its geography and land uses. Residents and visitors value the scenic beauty and recreational opportunities afforded by the State's rural communities, working farms and forests. The public expresses these values in numerous ways, including support for land preservation ballot initiatives and a state-level commitment to preserving farms, forests, and open space.

The public's willingness to pay for land preservation derives from the non-market *amenity benefits* provided by rural lands. These benefits are direct, positive influences on people's quality of life, and are not often reflected in market values of land. Over time, market forces—which reflect market values only—likely lead to too much development and too little preservation of farm, forest, and open space. Between 1997 and 2002, Connecticut lost over 12 percent of its land in farms, the highest percentage loss of any state in the U.S.² The challenge for policy makers is to find a way to quantify the true value of farm, forest and open space preservation to Connecticut residents, and to incorporate these values into land use and preservation decisions. This report presents results from a study which uses economic valuation techniques to estimate these values.

Measuring Preservation Values in Connecticut

In 2006, Connecticut voters passed 86 percent of local bond initiatives for farm, forest and open space preservation; these votes reflect the public's willingness to accept tax increases in return for land preservation, or *willingness to pay*. However, these votes do not reveal exactly what types of preservation people value, and the magnitude of associated values. Building on the voting model, however, economists have developed methods for measuring willingness to pay for

² National Agricultural Statistics Service, *2002 Census of Agriculture*, 2002, Washington DC.

environmental amenities (such as those provided by farm and forest land) by replicating a voting situation in carefully designed surveys. This method is called the *choice experiment*. Choice experiments let researchers quantify the benefits that people receive from preservation of particular types of farm, forest and open space. The results of these studies reveal the value of rural land preservation to Connecticut residents.

In 2005, researchers from the University of Connecticut and the University of Delaware mailed a self-administered choice experiment survey to 1000 randomly-selected Connecticut residents across the State. The *Connecticut Land Preservation Survey* presented respondents with a chance to vote yes or no over many different statewide land preservation options with varying tax costs to their households. Statistical analysis of thousands of votes over hundreds of different preservation choices enabled researchers to derive estimates of the average willingness to pay to preserve different types of farm and forest land. These estimates reflect additional taxes and fees that Connecticut residents would be willing to pay in order to obtain specific types of farm and forest preservation in the State. Of the 900 surveys that were deliverable, 32 percent were completed, generating a sample of 288 responses representing a broad cross-section of State residents.

What is the Value of Farm and Forest Preservation?

Survey responses reveal willingness to pay per household, per acre, per year for the type of open space specified in the survey questions. Aggregating (or adding up) responses over Connecticut households provides an estimate of the total annual value per acre³. Annual values can be capitalized over time by discounting the future cash flows at an appropriate rate (in this

³ This analysis aggregates over 32% of Connecticut households (410,000 total), the same proportion of households as those who responded to the survey questionnaire. This is a very conservative assumption, in that it assumes that the 68% of survey recipients who did *not* respond chose not to respond because they had zero willingness to pay for land preservation

case, 6 percent).⁴ Based on these methods, **the average value that Connecticut residents place on preserving each additional acre of farm or forest is \$6,595 per year, or \$109,914 in total capitalized value.** However, values differ depending on land attributes and the type of preservation. The highest preservation values obtained in this survey were in excess of \$250,000 per acre in capitalized value. Higher values were associated with land at a high risk of development and land that offers public access. Lower values were associated with land that offers no public access and land that has a low risk of development.

Figures 1 and 2 show a sample of different preservation options and their associated values⁵. Definitions of the row and column headings are as follows:

- ***Outright purchase*** means purchase and preservation of farm and forest by government or nonprofit groups (land trusts).
- ***Preservation contract*** (also called *conservation easements* or *purchase of development rights*) means that interested landowners are paid a fee in return for placing a legal contract on their land that prevents all future development.
- ***High risk*** means land that is likely to be developed within the next 10 years if it is not preserved.
- ***Moderate risk*** means land that is likely to be developed between 10 and 30 years if it is not preserved.

⁴ This is the same method that would be used to assess the market value of a business or a working farm the provided a flow of revenues every year. The (present) value of a business is the sum of all the expected cash flows generated by that business – in essence, a purchaser is paying now for the opportunity to obtain income in the future. But people will not pay a whole dollar today for the opportunity to obtain a dollar in the future. Future cash flows are worth less than present cash flows, reflecting the time value of money. As a result, future cash flows must be *discounted* in order to make them comparable to cash flows today. A discount rate of 6 percent means that a dollar to be received next year is worth 94.3 cents today, a dollar to be received two years from now is worth 88.9 cents, and a dollar to be received 20 years in the future is worth only 31 cents today. Adding up all the (discounted) future cash flows over time is called *capitalizing* an investment.

⁵ It is important to note that these values are applicable only to the next 5,000 to 10,000 acres being preserved, and should not be used to evaluate all of the remaining open space in the state. This is because of diminishing marginal utility – as additional farm land is preserved, people’s willingness to pay will diminish.

- **Moderate access** means that 50 percent of preserved acres offer public access.
- **Full access** means that 100 percent of preserved acres offer public access.

By cross-referencing preservation methods and types of land in figures 1 and 2, one can locate specific preservation values. For example, *crop land*, preserved via a *conservation easement administered by the state*, providing *moderate access*, and at a *high risk of development*, has a capitalized value of \$136,805 per acre. *Forest land*, preserved via *outright purchase by the state*, providing *full access*, and at a *moderate risk of development*, has a capitalized value of \$113,211 per acre.

The numbers in this report are for *statewide preservation initiatives* where the specific location of preservation in the state is not yet known. As a result, small annual per household values are multiplied by a large number of state households, generating large aggregate values for the entire state. The willingness to pay per household is reasonable (often a few cents per acre preserved). It should also be noted that preservation does occur in specific communities, so the value of open space preservation for local residents may be even higher, once the specific location of preservation is known. In most cases the higher local values can (with a few adjustments) be added to statewide values to obtain total preservation values. So, even those types of preservation listed in figures 1 and 2 as having “negligible” values from a *statewide* perspective may nonetheless have significant values to people in the *local community* where land is preserved. These local values are provided in another report by the same authors.

Figure 1. Per Acre Preservation Value for Food/Dairy Farms and Idle Farmland

		Food or Dairy Farm		Idle Farmland	
Level of access		High risk	Moderate risk	High risk	Moderate risk
Outright Purchase by a Land Trust	Moderate	\$257,598	\$223,670	\$286,012	\$252,084
	Full	\$234,519	\$200,591	\$262,934	\$229,005
	None	\$150,735	\$116,807	\$179,149	\$145,221
Outright Purchase by the State	Moderate	\$123,242	\$89,314	\$151,656	\$117,728
	Full	\$100,164	\$66,236	\$128,578	\$94,650
	None	\$16,380	negligible	\$44,794	\$10,865
Preservation Contract (Land trust)	Moderate	\$187,426	\$153,498	\$215,840	\$181,912
	Full	\$164,348	\$130,420	\$192,762	\$158,834
	None	\$80,563	\$46,635	\$108,978	\$75,049
Preservation Contract (State)	Moderate	\$136,805	\$102,877	\$165,219	\$131,291
	Full	\$113,727	\$79,799	\$142,141	\$108,213
	None	\$29,942	negligible	\$58,356	\$24,428

Figure 2. Per Acre Preservation Value for Nursery Farms and Forest

		Forest		Nursery Land	
Level of access		High risk	Moderate risk	High risk	Moderate risk
Outright Purchase by a Land Trust	Moderate	\$304,573	\$270,645	\$221,225	\$187,297
	Full	\$281,495	\$247,567	\$198,147	\$164,218
	None	\$197,710	\$163,782	\$114,362	\$80,434
Outright Purchase by the State	Moderate	\$170,218	\$136,289	\$86,869	\$52,941
	Full	\$147,139	\$113,211	\$63,791	\$29,863
	None	\$63,355	\$29,427	negligible	negligible
Preservation Contract (Land trust)	Moderate	\$234,401	\$200,473	\$151,053	\$117,125
	Full	\$211,323	\$177,395	\$127,975	\$94,047
	None	\$127,539	\$93,611	\$44,191	\$10,262
Preservation Contract (State)	Moderate	\$183,780	\$149,852	\$100,432	\$66,504
	Full	\$160,702	\$126,774	\$77,354	\$43,426
	None	\$76,918	\$42,989	negligible	negligible

The Benefits and Costs of Preservation: An Illustration

How can the dollar amounts in Figures 1 and 2 be used to assess the benefits and costs of open space preservation in Connecticut? Consider the example of recent preservation initiatives in Hartford County. Recently, the town of Simsbury (via the Simsbury Land Trust) purchased the development rights on four of the remaining working farms in the town. The price paid for the development rights averaged \$16,000 per acre. Referring to the attributes in Figure 1, these are best characterized as *food or dairy farms*, at a *moderate risk* of development, preserved via a *preservation contract* administered by a land trust, and providing *moderate access*. The aggregate state-wide willingness to pay for these farms, therefore, is \$153,598 per acre (see figure 1). Another acquisition in Simsbury, of forested land at a high risk of development, is currently underway at a price of \$32,763 per acre. At the August 15, 2006 Board of Finance meeting, the Chairman of the Finance Board expressed concern about the discrepancy between the per-acre purchase price of the two different types of land – working farm land at a moderate risk of development for \$16,000 per acre vs. forested land at a high risk of development for \$32,000 per acre.⁶ Referring to Figure 2, the statewide willingness to pay for *forested land*, at a *high risk* of development, preserved via a *preservation contract* administered by a land trust, and providing *moderate access* is \$234,402 per acre—substantially higher than the willingness to pay for preserving the previously described farm land. These results show the significant differences in benefits and values associated with different types of open space preservation.

These results also point to the difference between the **market prices** negotiated in these types of land transactions and the **willingness to pay values** reported here. It is important to keep in mind that willingness to pay reflects the public's values for the benefits that they receive from open space. Benefits from open space derive from such things as recreational uses, scenic vistas,

⁶ Minutes of Town of Simsbury, Board of Finance meeting, August 15, 2006.

community character, or appreciation of the fact that farm and forest can be passed on to future generations. **These benefits are not generally reflected in real estate prices.**⁷ In contrast, this study shows that the public benefit from open space preservation can be far in excess of the market prices paid for particular parcels of land. In other words, open space preservation is often a good value for the residents of Connecticut—the benefits far exceed the costs.

Do These Results Make Sense?

Yes, these results make sense, and are consistent with values found repeatedly in other areas of the country. Although these values—average willingness to pay in excess of \$100,000 per acre for open space—are quite large in aggregate, they are based on reasonable and modest payments per household. For example, if 32 percent of households in CT were willing to pay one penny per acre, per year, that would add up to \$4,100 per year, or a capitalized value of \$68,337 per acre. These numbers are, however, based on survey responses, not actual binding votes. Do people answer the surveys the same way they would actually vote? Research shows that surveys such as this one can predict actual votes and willingness to pay very closely if the survey is properly designed.⁸ Moreover, results such as this are common nationwide, and particularly in the northeastern United States. Many other New England open space preservation analyses have shown large public values for the preservation of rural lands.

Implications for Farm and Forest Preservation in Connecticut

⁷ For example, this study should not be interpreted as suggesting that land trusts should offer \$100,000 per acre for open space throughout the state, when the local real estate markets value the land at a quarter of that price.

⁸ See Johnston, R.J. 2006. Is Hypothetical Bias Universal? Validating Contingent Valuation Responses Using a Binding Public Referendum. *Journal of Environmental Economics and Management* 52(1): 469-481.

Willingness to pay for land preservation in Connecticut can be substantial. Real economic value derived from open space preservation frequently exceed \$100,000 per acre—often far exceeding the market cost of preserving this land. As a result, Connecticut as a whole is better off when farm and forest land is preserved, and worse off when it is left unpreserved and open to development. The benefits associated with farm and forest preservation can differ markedly, however, depending on the type of land preserved. Nonetheless, most land-use types are associated with substantial preservation values.

About the 2005 Connecticut Land Preservation Survey

This research was funded by the National Research Initiative of the Cooperative State Research, Education, and Extension Service, USDA, Grant 2003-35400-13875. The study was designed to help policymakers better understand the values that the public holds for the preservation of farm, forest, and open space. The principal investigators on this study were Robert J. Johnston, associate professor, Department of Agricultural and Resource Economics and associate director, Connecticut Sea Grant college program, both at the University of Connecticut; and Joshua M. Duke, associate professor, Departments of Food and Resource Economics and Economics, and the Legal Studies Program, University of Delaware. The experimental design was completed by Lidia Rejto and Diccon Bancroft at the University of Delaware STATLAB. Tammy Warner Campson is a graduate research assistant in the Department of Agricultural and Resource Economics at the University of Connecticut, and assisted in analyzing study results and writing this report. Further information on the study, data, and methods is available from Dr. Robert Johnston, University of Connecticut at Avery Point, 1080 Shennecossett Rd., Groton, CT 06340-6048. (860) 405-9278, robert.johnston@uconn.edu.