

Economic Benefits of Farmland Preservation: Evidence from the United States

by

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Abstract

For the last 50 years, local, state and the federal governments have expressed concerns about farmland retention. Four benefits have been used to warrant farmland preservation programs: food security and local food supply, viable local agricultural economy, environmental and rural amenities, and sound fiscal policy and orderly development. We explore the available evidence of how well farmland preservation programs have provided these benefits. Research suggests that people clearly desire farmland preservation programs and express a willingness to pay for the environmental and rural amenities provided. Some evidence has been found that farmland preservation programs can benefit the local economy and/or have no negative impacts relative to other economic development opportunities. The programs appear to slow farmland loss and thus may be having an impact on local government expenditures and orderly development, but the evidence here is limited due to methodological issues.

Keywords: Farmland preservation, food security, environmental amenities, rural amenities, local agricultural viability, orderly development, sprawl

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Introduction

Many people privately, or intellectually, support farmland preservation because of perceived benefits, including food security, less sprawl development, and amenity benefits. Such support might manifest financially, expressed directly through donations to land trusts or indirectly through voting for bond referenda or for representatives who fund state and local preservation programs. This revealed public support derives from a balancing of economic benefits expected to accrue from preservation and the expected costs. Incentive problems, such as missing markets and free riding, prevent the perfect alignment of private and public support. Nevertheless, preservation financing occurs and the task in this paper is to evaluate whether communities actually obtain what they think is important from farmland preservation.

Three decades ago, Gardner (1977, pp. 1028-9) proposed a conceptual model, assessing four types of economic benefits from agricultural land preservation: (1) food security; (2) a viable local agricultural industry; (3) amenities; and (4) orderly and fiscally sound development. Others have emphasized similar benefits, but articulated them slightly differently, including the slowing of suburban sprawl, providing a productive land base for the agricultural economy, the amenity values of open space and rural character, protecting wildlife habitat, and providing an opportunity for groundwater recharge in areas where suburban development is occurring (Wolfram 1981; Fischel 1985; McConnell 1989; Bromley and Hodge 1990; Lynch and Musser 2001; Duke and Aull-Hyde 2002). More than 124 U.S. governmental entities have implemented farmland preservation programs (AFT 2005a, AFT 2005b, AFT 2001) and over 1.67 million acres are now in preserved status. Spending in both state and local programs to purchase this acreage was \$3.723 billion (AFT 2005a, 2005b). Citizens continue to pass ballot initiatives generating funds for these types of programs: in 2002, \$5.7 billion in conservation funding was authorized; in 2001, \$1.7 billion; and in 2000, \$7.5 billion, and most recently in 2006, \$5.73 billion (Land Trust Alliance 2006). In addition, the Land Trust Alliance reports that U.S. land trusts have doubled their conservation acres from 6 million to 11.9 million acres since 2000.

The more than 124 governmental entities running farmland preservation programs use these benefits to rationalize their efforts. States cite these benefits in the statutes that establish farmland preservation programs. In a review of these statutes, Nickerson and Hellerstein (2003) found that protection of rural amenities such as rural character, scenic beauty, and wildlife habitat, is the most frequently mentioned objective followed by food security and environmental services. However, few measures of these benefits are incorporated into the ranking policies for selecting parcels for preservation—in part, because these benefits are difficult to measure. Instead, actual preservation program ranking policies focus on readily available land characteristics, such as soil productivity, traditional agricultural uses, parcel size, and contiguity. As a result, programs tend to favor preserving large grain farms and it is unclear how well this strategy provides the benefits that the public expects when it supports preservation.

This paper reviews the existing empirical research about the benefits of farmland preservation. Some studies evaluate the relative importance of or public willingness to pay for the various benefits. Other studies examine the impact preservation has had on land markets, and this paper uses their results to evaluate a possible source of benefits to the public. A better understanding of these benefits will help policymakers evaluate the performance of preservation programs and will help researchers identify gaps in our understanding. The framework proposed by Gardner (1977) is used to organize the review. Gardner (1977) was most comfortable with the economic rationale of intervening in farmland markets to provide amenities, and so it is not surprising that many have focused their work on this type benefit. Somewhat less evidence exists for understanding the impact of preservation on local economies. The benefits of food security and orderly development have rarely been directly examined, but some indirect evidence is found. This paper reviews available evidence on each of Gardner's (1977) four benefits, in turn.

Food Security and a Local Food Supply

According to Fischel (1982) and Dunford (1983), while U.S. farmland is disappearing from certain regions, sufficient national land resources remain to ensure the nation's food security. However, many people are revealing preference for and supporting the provision of local sources of farm products, presumably to obtain fresher products, avoid lengthy

transportation, and support the local agricultural economy. In a survey in Delaware, Duke and Aull-Hyde (2002) found that providing locally grown produce was the most important of ten reasons for supporting farmland preservation. Kline and Wichelns (1996) survey of Rhode Island residents estimated that this attribute was the fourth most important out of eight. Preserving farmland for future food security also provides a public benefit. In fact, Tweeten (1998) proposes that providing the “option” for future food security may be a strong justification for preservation programs even if food security is not currently a concern.

Market data suggest that local farmland product markets, especially direct-to-consumer markets, are substantively important and growing but still small compared to the overall agricultural economy. Common types of farmer-to-consumer direct operations are pick-your-own operations (PYO), roadside stands, farmers' markets, and direct farm markets. The number of U.S. farmers' markets has more than doubled in the last 20 years, from approximately 1,200 in 1980 to over 2,800 in 2000 (Festing 1998; Griffin and Frongillo 2003).

Similarly, a newer way to obtain local farm produce is a community supported agriculture (CSA) group. CSA groups in the United States continue to grow from an estimated 635 in 1996 to over 1,000 in 1999 (Well and Gradwell 2001). In a CSA group, farmers share the economic risks with consumers who pay a pre-season subscription to the farm in return for a weekly delivery of produce throughout the growing season. If the farm does well, participating consumers receive a bigger share of local produce and if the farm has a bad year, they receive less. The risk sharing and premia paid by CSA members should help farms in urbanizing areas maintain a competitive edge via-a-vis competing land uses.

Other forms of farmland preservation complement such efforts to ensure a continued supply of locally grown produce and meet the demands of a growing clientele of interested local customers. In sum, one can readily build an argument that farmland preservation supports the creation and growth of local agricultural product markets and the evidence does suggest these markets are important. However, no evidence was found that directly links the level of preservation expenditures or acres preserved to economic impacts in these local farm product markets.

A Viable Local Agricultural Industry (with Employment Opportunities)

Survey data suggests that the public supports preservation, in part, to ensure the continuance of the local agricultural industry. For Delawareans, “keeping farming as a way of life” ranked second and, for Rhode Islanders, it ranked fourth as reasons to support preservation (Duke and Aull-Hyde 2002; Kline and Wichelns 1996). Unlike the case of food security, the evidence on whether preservation actually enhances local agricultural economies exists and has clear results.

Preservation does not mean that economic development stops. In fact, farmland preservation programs can signal a commitment to an industry that then stimulates the industry to invest and work to be successful rather than waiting to “sell out”. A survey of farmers in four Maryland counties examined the difference in behavior between those that had participated in farmland preservation and those that did not (Lynch 2007). Lynch (2007) found that farmland preservation participants were more likely to have invested in their farm in the last five years: 66% compared to 55% for nonparticipants. In addition, the owners of the preserved farms were more likely to attend workshops to learn new technologies and enhance their farming skills. Sixty percent of those farmers who had preserved their farms had attended workshops at least once compared to 38 percent of nonparticipants.

Lynch (2007) also found 78% of participants said they preserved their farm to keep it in the family and 42% said they wanted the money for their farm operation. Participants used the money they were paid to preserve their land in ways that benefits the local economy. Thirty-five percent of farmers used the money to reduce debt making their operation more solvent. Another 28% saved the money or invested it in the farm. Eighteen percent used it to finance their farming operation. Twelve percent used the money to finance their retirement instead of selling the land to do so. Some bought additional land or farm equipment for their operation (Lynch 2007).

The Maryland participants were also those most likely to have productive operations and planned to continue farming, according to Lynch and Lovell (2003). Growing crops (57% for participants compared to 38% for non-participants), having a larger farm (127 acres compared to 35 acres), having a high percentage of family income from farming (40% had more than 25% of income from the farm compared to 15%), and having a child who plans to continue farming (28% compared to 12%) increased one’s likelihood of enrolling one’s farm in the preservation program. In more recent research on the Mid-Atlantic States, Liu and

Lynch (2006) find that counties with farmland preservation programs have lower rates of farmland loss than similar counties without such a program. Therefore, the investment being made in these types of programs helps to slow the rate of farmland loss and ensure an on-going industry.

In Delaware, Duke and Ilvento (2004) found that participants tend to own larger farms and are more likely to be full-time operators. Participants were also found to be attracted to farmland preservation to relieve debt pressure and reinvest in their operations. Duke and Ilvento (2004) found that preservation funds were used by 33% of participants to decrease mortgage debt, by 15% to purchase additional land, and by 15% to purchase farm equipment. Together, these results align well with those from Maryland and suggest that participating Delaware farmers are using preservation as a way to maintain a sustainable agricultural economy.

Lynch and Carpenter (2003) found that the overall health of the local economy impacted the rate of farmland loss. Healthy local economies (higher employment rates and higher incomes) had lower rates of farmland loss, all else the same. In a study of 46 preservation programs, Sokolow (2006) finds little evidence that preservation programs have helped retain a viable support sector suggesting the support industry may have reoriented to new suburban residents. He does find though that preserved land remains in farming even if sold to non-farmers. New owners rent the property to local farmers. Preferential or use-value taxation programs were found to increase farmer's and landowner's wealth which then could stabilize the financial health of the agricultural operations (Chicoine, Sonka, and Doty 1982).

This begs the questions of how much land must be preserved to ensure a viable industry, i.e., is there a critical mass threshold for the agricultural industry? Lapping (1982) emphasized the importance of protecting a critical mass of farms and farmland in order to keep the agricultural support businesses in operation. However, Lynch and Carpenter (2003) did not find strong evidence of a critical mass. Carpenter and Lynch (2002) did find that counties with less than 50,000 acres of farmland had annual rate of farmland loss of 2.36% compared to the average rate of 1.57% for all counties; counties with between 50,000-150,000 acres had a rate of farmland loss of 1.88% to 1.98%. Lynch and Carpenter (2003) also found that 42% of the study's counties derived their largest share of income from a different commodity or animal source in 1997 than in 1949 (Figure 1). They concluded that some

agricultural sectors did not survive as agricultural land was lost but that counties could stem the tide of farmland loss if farmers adjusted their crop and/or livestock mix. A critical mass for certain sectors may exist. For example, Adelaja, Miller and Taslim (1998) indicate that because New Jersey no longer has a critical mass of dairy farmers, it does not offer all the extension programs and services to dairy farmers that the neighboring states provide, which can impact input costs and management quality.

Additionally, preserving the agricultural industry provides open space attributes and rural amenities that can attract tourists and new residents to an area. Contrary to many communities' concerns that the conservation and preservation policies may have negative effects, Lewis, Hunt, and Plantinga (2002) found that communities that managed land for conservation purposes did not have lower employment growth rates. In fact, they found that when forest lands were managed for preservationist uses rather than multiple uses (including extractive uses such as timbering) more people moved into the counties with more conservation land than moved out possibly because of the additional amenities provided by such lands although this effect was relatively small. In addition, Lewis, Hunt, and Plantinga (2003) conclude that preservationist policies do not cause the local community to shift from high wage to low wage jobs. Wage growth rates were not affected by amount of land in conservation (non-extractive) uses compared to multiple (including timbering) uses. While Lewis, Hunt, and Plantinga (2003) do not suggest that preservation or conservation policies are necessarily the best economic development stimulators, they clearly show that their impacts are not different from resource extraction policies. Farmland and open space provide the foundation for the tourist industry in more than a few states (Daniels and Bowers 1997)

Similarly, Duffy-Deno (1997) found no effect from land preservation for wildlife habitat purposes on employment levels or growth rates. Examining 333 non-metropolitan counties, he found that employment growth after the listing of endangered species and limits on development occurred was similar between counties that had listed endangered species habitat and those that did not.

Protection of Rural and Environmental Amenities

For many economists, rural and environmental amenities are the main reason why local communities might consider farmland preservation programs. Economists tend to follow Gardner (1977) in arguing that the most justifiable reason to intervene in agricultural markets is market failure and preservation directly addresses the market failure associated with amenities, which have public good or positive externality characteristics. Food supply/security and the agricultural economy constitute goals that have related markets where goods and services are bought and sold. If people want to have locally grown food and a strong local agricultural economy, then they can patronize local farms and buy local goods to achieve these ends. However, rural amenities are not what we consider market goods—they are not bought and sold—and instead have the characteristics of public goods. Some type of public intervention is needed to ensure they are supplied. It is not surprising, therefore, that a large number of economic studies have valued the amenities from land preservation and these values suggest that many communities are receiving larger benefits from preservation than it costs.

Rural and environmental amenities could include views of cows in the meadow or fields of flowing wheat, open fields where rainfall recharges the groundwater, and areas where wildlife enjoy quality habitat. Bergstrom and Ready (2006, pg 2) define three types of amenity benefits of farmland protection: public access use values (e.g., farm and ranch tours, local “pick-your-own” fruits and vegetables), use values that do not involve public access (e.g., countryside scenery viewing, prevention of undesirable development) and nonuse values (existence values of wildlife living on farm and ranch land, cultural heritage values, national food security). Researchers used surveys to determine which of these benefits were important to individuals and local communities considering a farmland preservation program (Table 1). In general, the public favors a mix between agricultural objectives such as local food production and a rural way of life and environmental objectives such as water quality and wildlife habitat. Also, rural amenities are frequently mentioned, which may incorporate both agricultural and environmental objectives as well as attributes like scenic quality.

One set of studies uses survey data to identify and rank the importance of the different types of amenities. Delawareans ranked water quality protection and scenic quality protection highly when compared to rankings for providing wildlife habitat, preserving breaks in the built environment, and preserving natural places (Duke and Aull-Hyde 2002). Rhode

Islanders agreed about the importance of water quality protection, but found that scenic quality was less important and that wildlife habitat and natural places were important (Kline and Wichelns 1996). In another paper by Kline and Wichelns (1998), respondents specified that preserving fruit and vegetable farms and woodlands was most important followed by cropland and land adjacent to water. Respondents were grouped statistically and labeled, so that environmentalists favored forests, rural amenity seekers favored crop and pasture farmland, and agrarian supporters favored fruit and vegetable farmland. Krieger (1999) found that people outside Chicago supported farmland preservation to ensure food supplies, protect family farms and control development. The most important aspect of preserving open space was its role in slowing growth and reducing sprawl. Continued sprawl meant the loss of scenic beauty, increases in air and water pollution, and loss of wildlife habitat to the Illinois respondents. Bastian et al. (2002) found that people would be willing to pay more for agricultural land that preserved wildlife habitat, had angling opportunities, and provided scenic views in addition to agricultural production. In a related study, Rosenberger (1998) found that Coloradans ranked environmental goals above open space goals. Most recently, Kline (2006) has linked public interest and support for preserving open space in specific areas to population growth, rising incomes, pace of development, and increasing open space scarcity.

Economists use two approaches to assess how much people are willing to pay for these amenities, which then helps evaluate whether the benefits of provision exceed the cost and also signals how much land should be preserved. The first approach asks people directly to state their preference about how much they would be willing to pay to preserve farmland giving people various scenarios to consider (i.e., contingent valuation, choice experiments, conjoint analysis). The second is to evaluate actual housing sales in the market to determine if the presence of preserved farmland, forest, and cropland increases or decreases the value of a house (i.e., hedonics).

Using the stated preference methods, research has found that the annual willingness to pay varies from a low of \$.0002 (Bergstrom, Dillman and Stoll 1985) to a high of \$44 (Swallow, 2002) per household per year per acre with mean willingness to pay values being \$0.142 for contingent valuation studies and \$0.17 for choice experiments (see Bergstrom and Ready 2006 and McConnell and Walls 2005 for a synopsis, Beasley, Workman and Williams

1998, Bowker and Didychuk 1994, Ready, Berger and Blomquist 1997, Rosenberger and Walsh 1997, Johnston et al. 2001, Ozdemir 2003, Swallow 2002). Values are higher in areas which are losing agriculture more rapidly—Suffolk County, New York, and Alaska as compared to a rural South Carolina county. Table 2 outlines the average willingness to pay for some of these studies as well as the total values for all households in a particular area. Halstead (1984) found that Massachusetts's residents would have paid \$28 to \$60 per year to prevent the conversion of farmland to low density housing and \$70 to \$176 to high-density housing. In South Carolina, Bergstrom, Dillman and Stoll (1985) found lower numbers with a household saying it would pay \$9 to \$16 per acre per year per thousand acres (2000\$) to increase the number of acres preserved. The authors suggest this lower number may result because the area studied is predominately rural so even if some agricultural land is lost that other agricultural land and the associated amenities are still quite close. Beasley, Workman and Williams (1986) examined the value to households of preventing the conversion of farmland in Alaska near Fairbanks. Households indicated they would pay \$76 per year to avoid moderate development and \$144 per year to prevent the conversion of most of the land. The region's value per acre was \$830. In Eastern Canada, households responded that they would each pay \$49 to preserve 23,000 acres up to \$86 each to preserve 95,000 acres. Ready, Berger and Blomquist (1997) found that people were willing to pay more taxes to retain land in thoroughbred horse farming in Kentucky. They estimated that the median value of a converted farm is about \$0.49 per person per year (1990\$). This increases as people perceive a higher percentage of farms will be lost. Rosenberger and Walsh (1997) find that households will pay \$86 to increase preserved ranchland from 25 to 50 percent and to \$162 to increase from 50 to 75 percent. People in the Rocky Mountains were willing to pay more than those in South Carolina and eastern Canada, similar amounts to those in Alaska but less than those in the urban fringe of Massachusetts. Feather and Barnard (2003) conclude that even under conservative assumptions about willingness to pay the benefits are large and may outweigh the costs of preservation.

In a slightly different type of study, Lopez, Shah, and Altobello (1994) found that two of the three studied rural communities in Massachusetts and Alaska had too few acres of farmland relative to the optimum amount suggested by the communities' value for farmland. Given the public's willingness to pay to retain agricultural land, the authors conclude that in

highly urbanized areas, the local area would have been better off if more land had been preserved for agricultural uses.

Many studies (although not all) have found that people will pay more for houses near farmland (Table 3). Geoghegan, Lynch, and Bucholtz (2003) found that in 2 of the three Maryland counties they studied, adjacency to preserved farmland actually increased the value of nearby houses. Irwin (2002) finds that people are willing to pay more for a house near permanently preserved open space (\$3,307) rather than pastureland that could be developed at some point in the future. Irwin (2002) suggests that that people value open space because it is not development. In a study in Ohio (Irwin, Roe, Morrow-Jones 2002), the value of preserving a single acre as permanent cropland is between \$1 and \$3 per year and from \$12 to \$38 per house (about 1% to 4% of housing value). Thornes (2002) finds that people are willing to pay \$5,800 to \$8,400 more for a lot or a house next to a forest. Sengupta and Osgood (2003) found that hobby ranchers would pay an extra \$1,416 for their parcel if it is next to greener pastures in the Southwest. Ready and Abdalla (2005) found that open space within 400 meters of one's house increases its value in Pennsylvania. They find that forest land increased housing value more than crop or pasture land and that preserved land increased housing values less than developable land—the reverse of the Maryland studies (Geoghegan, Lynch and Bucholtz 2003 and Irwin 2002)—although forest, preserved and developable land all increase housing values. In their examination of the value of open space, McConnell and Walls (2005) conclude that people with higher incomes tend to value open space more.

In sum, the literature suggests that land preservation can provide large benefits. The stated preference and hedonic studies show that this value varies by the location of the study, which is not surprising since localities will hold different aggregate preferences for preservation and have different relative scarcity of amenities. However, one unifying element of the stated preference surveys is that they aggregate over the number of households in the study area. As such, stated preference surveys will estimate higher benefits for preservation, *ceteris paribus*, in more populated areas. Another conclusion is that the values of the benefits of preservation estimated by both methods tend to be substantively large relative to prevailing costs, and thus one is led to believe that many past efforts at preservation enhanced social welfare simply in their provision of amenities.

Orderly and Fiscally Sound Development and Property Tax Revenues

Since governments, in broad strokes, determine the pattern of development via zoning and other regulations, it seems odd that governments and nonprofits must then intervene in agricultural markets to preserve land in order to secure the benefits of orderly development. Nevertheless, many see one benefit of preservation is the prevention of sprawl and other less preferred aspects of the developing landscape. While included in many states' enabling legislation, surveys find preservation of rural character and slowing development may be less important to local citizens than other reasons mentioned above (Kline and Wichelns 1996; Duke and Aull-Hyde 2002). Local and state governments may view the voluntary nature of preservation programs as more politically palatable methods of achieving orderly development.

In addition, local government may benefit fiscally. For example, while the preferential taxation programs results in agricultural land paying less property tax than if it were taxed at the land full market value, cost of community services studies across the United States have found that agricultural lands pay more in property taxes than the cost of the services they use (Daniels and Bowers 1997), i.e., agricultural land has a net positive benefit in terms of property taxes collected subsidizing residential development. In addition, if housing prices increase when agricultural land is preserved, farmland preservation programs may actually increase the tax revenues of local communities even when the counties have preferential taxation programs. Geoghegan, Lynch, and Bucholtz (2003, 2006) found that preserved farmland increased the value of nearby houses enough to generate sufficient property tax revenues to enroll additional acres of agricultural land into the preservation programs. Geoghegan, Lynch, and Bucholtz (2006) conclude that agricultural preservation programs could be self-financing at least in the short-term, though this may not hold in rural or predominately agricultural counties. And of course, communities could use the additional taxes for other purposes.

When examining the effect of preservation on development patterns and/or conversion of agricultural land, conflicting outcomes have been found. Nelson and Moore (1996) find mixed results on Oregon's effectiveness in directing development away from rural lands into designated growth areas. They suggest stronger and more uniform regulations on rural land development between governmental entities may increase effectiveness. More recent

evidence suggests that Oregon's approach to preserving resource land has direct growth away from forest and agricultural lands (Kline 2005). Nelson (1999) also finds that Florida's and Oregon's growth-management efforts accomplish their objectives including farmland preservation when compared to Georgia which had no growth management policies. Irwin, Bell, and Geoghegan (2003) find that an agricultural preservation program can slow the conversion of parcels nearby. They conclude though that farmland preservation alone will have limited impacts on concentrating growth thus a multitude of policies may be needed to direct development away from agricultural areas.

Conversely, recent evidence suggests that the positive amenities generated by these preservation programs may increase the demand for housing near the preserved parcels. Geoghegan (2002) find that permanent open space such as agricultural land enrolled in farmland preservation programs increases near-by residential land values over three times as much as an equivalent amount of "developable" agricultural and forest open space. This increased value then can create more conversion pressure. Similarly, Roe, Irwin, and Morrow-Jones (2004) find that preservation efforts could induce further residential growth in areas with short commutes to employment centers and small amounts of remaining farmland. While examining a slightly different policy, Irwin and Bockstael (2004) found that a clustering requirement to retain open space can actually increase the likelihood of development of nearby parcels. Lynch and Liu (2007) also find no evidence that designated preservation areas decreases the rate of conversion although they do increase the rate of preservation. Thus the impact of preservation programs on development patterns remains unclear.

Both farmland preservation programs such as the purchase of development rights and transfer of development rights programs and use-value taxation programs have been instrumental in slowing the rate of farmland loss thus at least in principal allowing for the possibility of more orderly development. Liu and Lynch (2006) found a significant decrease in the rate of farmland loss in the Mid-Atlantic region of the United States after a county began to preserve land. Sokolow (2006) concludes that the preservation programs help redirect urban growth when used in conjunction with other land use regulations. Lynch and Carpenter (2003) found that counties with preferential taxation programs had a farmland loss rate of 0.81% compared to counties without one at 1.6%. Preferential taxation programs also

stemmed the loss of farms with counties having preferential taxation programs having a farm loss rates almost 0.52% lower than counties without programs. Similar results were found by Gardner (1994), Blewett and Lane (1988), and Heimlich and Anderson (2001).

While these studies are suggestive of an impact on development patterns, they are not conclusive and suggest farmland preservation could attract or detract development to more rural areas. The lack of research studies on this question stems from methodological difficulties as well as the complexities of the issue given the multiple land use regulations in each area and the possible spill-over impact on adjacent regions and/or counties. For example, few studies have addressed why certain governmental entities have adopted preservation programs while others entities have not, leading to concerns about biased results. Definitely, more information on this topic would be useful for communities when they confront this issue. In addition, data limitations make addressing certain research questions difficult. For example, one important issue is whether farmland preservation programs are shifting developers to convert forest land at an increased level, i.e., is the net loss of open space held constant, or are they increasing the density of housing on the farmland they continue to convert, or is in-fill or higher density within urban areas occurring at a higher rate? Yet data on micro level development and forestland has been less available.

Conclusions

Farmland preservation can benefit local communities in many ways resulting in food security, economic viability, better quality of life (amenities), and orderly development. Gardner (1977, pp. 1028-9) summarized these goals, arguing that market intervention is best warranted for providing amenities because they have public goods characteristics. Many have used this direction in creating their research programs and much of farmland preservation research deals with amenity valuation and how much should society retain. Nevertheless, some studies address the other goals and, collectively, the opportunity exists to evaluate whether farmland preservation dollars are used successfully. This paper offered a synthesis of evidence from the United States.

The strongest evidence comes from the amenity goal. Numerous studies show that the public has coherent preferences for the amenities of preserved farmland and stated preference evidence estimates statistically and substantively significant values for these services. In sum,

the valuation studies suggest that much of past preservation activities probably passes the benefit-cost test.

Research also shows that preservation is likely enhancing the economic viability of agriculture. Participating landowners tend to be more actively engaged in farming and use preservation funds to bolster their operations, hence revealing a future commitment to agriculture.

Although less conclusive, some indirect evidence was found that preservation helps achieve the goals of orderly development and food security. Recent evidence suggests that preservation does affect development patterns and has some beneficial fiscal impacts. The conflicting results however, particularly the evidence that suggests preservation may increase the probability of conversion in rural areas warrants further study. On food security, the evidence is highly circumstantial; it shows that residents and consumers value some food attributes that are aligned with food security goals, but it does not show that preservation directly affects the supply of these food attributes. Farmland preservation programs may find targeting those farms most likely to provide local food to nearby residents or providing incentive to preserved farms to engage in these types of activities may generate the most public support.

As farmland preservation programs become more mature, we also can learn from their histories how to make them operate more effectively to increase the positive benefits. For example, Lynch and Musser (2001) found that if transfer of development rights programs allocated rights differently, i.e. not just based on the number of acres, they would be able to attain more of the programs' objectives – i.e. retain the most productive farms and those farms most threatened by conversion pressure. Several studies mentioned above suggest multiple policy instruments in addition to farmland preservation are needed to redirect development. Further research into the best mix of policy instruments needs to be determined. For example, Daniels and Lapping (2005) suggest that preservation programs should be included in smart growth programs as the two types of objectives complement one another. Farmland preservation programs that prioritize preserving contiguous farms may make orderly and fiscally responsible development more achievable (Lynch and Liu 2007) as well as creating agricultural enclaves with limited nuisance problems from non-farm neighbors that should promote agricultural viability.

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Table 1. Characteristics People Consider Most Important when Preserving Farmland.

Papers	Most Important Characteristics of Farmland Preservation
Kline and Wichelns (1996)	<ul style="list-style-type: none"> Environmental objectives Protecting groundwater Wildlife habitat Preserving natural places Aesthetic objectives Rural character Scenic Quality
Krieger (1999)	<ul style="list-style-type: none"> Local food supply Family farms Control development
Duke and Hyde (2002)	<ul style="list-style-type: none"> Agricultural way of life Local food supply Water Quality
Bastian et al. (2002)	<ul style="list-style-type: none"> Land with wildlife habitat Fishing opportunities Scenic views
Nickerson and Hellerstein (2003)	<ul style="list-style-type: none"> Rural amenities Rural character Scenic beauty Wildlife habitat Food Security Environmental Objectives

Table 2. Estimated Values to Society of Preserving Agricultural Land ¹

Papers	Average Willingness to Pay (2000\$)	Measure of value aggregated over households (2000\$)
Preserve land from development	Per household per year per thousand acres	
in South Carolina Bergstrom et al. 1985	\$9-16	\$23-\$61 per acre
in Alaska Beasley et al. 1986	\$126-239	\$830 per acre
in Eastern Canada Bowker and Didychuk 1994	\$62-\$109	\$123 per acre
in Colorado (Ranchland) Rosenberger and Walsh 1997	\$86-\$144	
in Suffolk County, New York Johnston et al. 2001	\$40-\$162	\$1,355 per acre per year

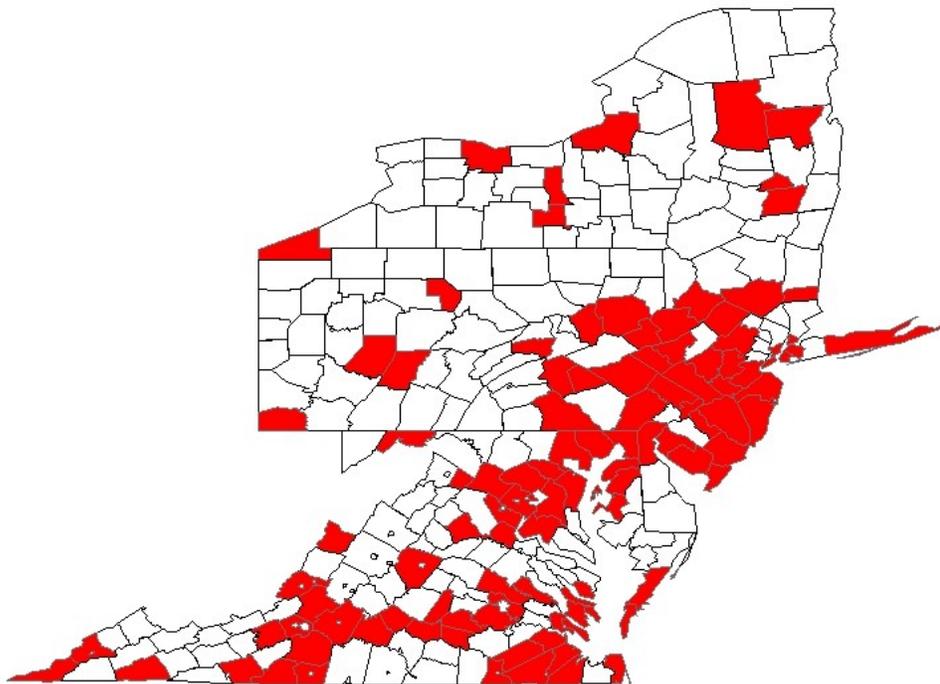
¹ Extracted from Table 2 “Estimated Values for Open Space Services from Stated Preference Studies,” of V. McConnell and M. Walls. 2005. The Value of Open Space: Evidence from Studies of Non-Market Benefits. Resources for the Future, Washington D.C., January.

Table 3 Estimated Values of Agricultural and Forest Proximity¹

Papers		Marginal Value in \$ (as percentage of mean house price)
Thorsnes (2002)	Back to forest preserve	\$5,800-\$8,400 (19%-35% of lot prices; 2.9%-6.8% of house price)
Irwin (2002)	Conversion of 1 acre of pastureland to conservation forest	\$3,307 (1.87%) -\$1,424 (-50.82%)
Geoghegan, Lynch and Bucholtz (2003)	1 percent increase in the open space surrounding the house	
	Preserved land	\$0-1,306 (0% to 0.71%)
	Unpreserved and convertible agricultural and forest land	-768 to 0\$ (-0.39% to 0%)

¹ Extracted from Table 1 “Estimated Values of Open Space Proximity from Selected Hedonic Price Studies,” of McConnell, V., and M. Walls. 2005. *The Value of Open Space: Evidence from Studies of Non-Market Benefits*. Resources for the Future, Washington D.C., January.

Figure 1. Many Counties have Changed Their Highest Income Crop and or Livestock between 1949 and 1997¹



Income Categories

- Same Source of Income
- Changed Largest Income source

¹ Lynch and Carpenter (2003)