



This Policy Brief Series has been prepared for Farm Foundation from papers presented at the Transatlantic Land Use Conference (TALUC), held from September 24-26, 2007, in Washington, DC. The Policy Brief is a collaboration of the University of Delaware and The Northeast Regional Center for Rural Development.



Using Research on Farmland Amenity Values to Improve Preservation Policy

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There is a growing awareness that farmland provides a host of non-market services, or amenities. These are benefits – beyond commodity production – to all types of residents (or “amenity consumers”) in rural, suburban, and urban areas. Farmland amenities include aesthetically pleasing views, habitat provision, groundwater recharge, and a lack of development (Irwin, et al. 2003). Although they are not necessarily amenities, farmland also provides closely related environmental benefits such as flood control and carbon sequestration (Legg 2007). The term “multifunctionality” reflects all of these services from active farmland: commodities, amenities, and other environmental services.

Land-use change threatens the provision of future amenities. At the rural-urban fringe, high-value development often outbids agricultural land uses. The public perceives conversion as too rapid, or poorly planned, and worries about reduced amenities. Strong political support exists for policy solutions, and some policies make cash payments to landowners in exchange for amenity provision. But are the benefits of preservation policy larger than the costs? An important step in assessing and improving the policy process is the proper valuation of amenities.

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What are the key research findings on amenity values? Irwin, et al. (2003) report that demand for farmland amenities:

- Rises with income levels.
- Increases with educational attainment levels.
- Increases with population growth, especially near the rural-urban fringe.
- Increases as agricultural land becomes more scarce.
- Decreases when other nonfarm, rural lands are abundant.
- Is higher for those located near preserved parcels, except when too many nonagricultural residences are nearby.

How large are amenity values? Duke and Johnston (2007) calculate farmland amenity values for Delaware residents and for an assortment of land uses.

The following are examples for parcels at high-risk of development and where preservation is conducted using a state conservation easement:

- Forest providing moderate levels of public access \$131,881 per acre
- Cropland with no public access \$54,691 per acre
- Nursery providing moderate levels of public access \$117,598 per acre

Duke and Johnston (2007) also find that amenity values differ when parcels are at a low-risk of development.

- Cropland with no public access \$2,233 per acre
- Cropland with high levels of public access \$65,132 per acre

At least 28 different types of policies to retain agricultural land use in the U.S. exist (Duke and Lynch 2006). Some of these policies simply alter zoning, changing land-use rules to encourage farming or to discourage development. Governments use incentive-based policies to subsidize agricultural uses (use-value tax assessment) or to penalize conversion activities (impact fees and exactions). The public is likely most familiar with participatory policies, through which governments enter land markets to expand demand for agricultural land use. The purchase of agricultural conservation easements (PACE) is the flagship participatory policy. Under PACE, governments buy negative easements to prevent development and, in effect, create market demand for amenities where little or none existed before. By 2004, over \$1.6 billion had been spent in the U.S. on PACE (American Farmland Trust 2004).

The E.U. also has an extensive set of policies that affect amenity provision (Bell 2007). Unlike the U.S., the E.U. has more unified multifunctional policies that address both soil/water management and land preservation, and also may include rural development provisions (Bell 2007; von Haaren and Bills 2007). Yet in both the U.S. and the E.U. policy makers face the challenge of balancing regulatory

restrictions with payments to landowners, and find that existing policies are not always perceived to be effective by the public (von Haaren and Bills 2007). U.S. and E.U. policies are somewhat difficult to compare because U.S. policies directly affecting amenity provision tend to emanate from the state and local levels. The E.U. has cross-compliance standards in their agri-environmental policies and other norms that allow for systematic comparisons of policy effectiveness, especially regarding pollution prevention but also related to amenity provision (Brouwer and Jongeneel 2007).

Unfortunately, in the U.S. and the E.U. there appears to be a large disconnect between research and policy regarding the measurement and use of amenity values. It is useful to clarify exactly what amenity valuation research can and cannot provide

Conservation easements are legal instruments that restrict landowners from pursuing developed land uses—typically, the wholesale conversion from agricultural and natural land uses to residential and commercial uses. Legally, conservation easements are “negative” easements in that they prevent the easement seller (the landowner) from using his or her land in a specified manner. Conservation easements do not give the easement buyer (governmental agencies, land trusts, etc.) the right to use the easement seller’s land; they only prevent uses. The easement seller thereby retains all other use rights typically associated with agricultural and natural land ownership.

to policy makers. This brief summarizes both research results and outstanding research challenges, and it also helps policy makers interpret the research. The impact of research on policy is the exclusive focus of the concluding section.

Research on Amenity Values

The market price of land poorly measures its amenity value. Economists view these situations as market failures because society’s valuation of amenities is not reflected in the price of land when a farm is sold for development. Nonmarket valuation measures amenity value using revealed preference and stated preference techniques. This brief focuses on evidence from the latter but does not address complications associated with negative impacts from agriculture (see Bell 2007; Legg 2007).

A recent review finds that amenity values are affected by parcel size, local scarcity of farmland, development pressure, land productivity, the intensity of farming, and whether food is produced for human consumption (Bergstrom and Ready 2005). In a policy brief on amenity values, Irwin et al. (2003) argue that some farmland-preservation benefits are unrelated to farming. Indeed, the public values the continuation of farming and long-term food security, but it also values the provision of wildlife habitat, groundwater protection, and growth controls. These benefits tend to vary by location. Hence, in some locations the highest amenity value lands may be the most productive, or “prime,” farmland, while in others they will be more marginal but with more rural or environmental amenities (Irwin et al. 2003; Duke and Johnston 2007). Even urban areas may

deliver high-value amenities and lower value, lower acreage production (Adelaja et al. 2007).

Challenges and Alternative Approaches

Accurately measuring amenity values is important for developing effective policy, especially when these values are used to justify payments to landowners. This section describes current research challenges in terms of accuracy of valuations and explaining spatial and other preference patterns.

Do we have accurate measures of amenity value? Research on amenity values offers many results and relentlessly refines its methods to test and improve survey instruments and statistical techniques. However, measurement accuracy remains a persistent challenge. The most recent studies are the most accurate and are most likely to have used the most recent techniques. Choice experiments provide a good example of the latter claim. Choice experiments are a generalized form of contingent valuation in that they allow one to measure the separate contributions to amenity value of a host of attributes of land, such as parcel land use, parcel size, and growth pressure. The results of choice experiments increase the diversity of parcels to which estimated amenity values can be applied.

Do we understand how amenity values vary across space? Explaining how amenity values change across the landscape challenges current methods. Studies using “distance-decay” find evidence about how values decline as residents are located farther from the preserved site. Using voting data, Bell (2007) also finds a distance impact. These studies suggest that the values may often extend beyond the boundaries of the political unit proposing preservation – a potential complication to policy. For instance, if Connecticut is proposing to fund the preservation of 10,000 acres of farmland but the benefits extend to residents of Rhode Island and Massachusetts, then preservation may be undersupplied because only Connecticut will tend to fund a program that meets its own needs. More effective policies will reflect the entire population holding values for preservation.

Do we understand patterns in amenity value? Other research suggests that patterns are more complicated than distance. Land preservation amenities have many public-good characteristics. Once supplied, these services are supplied to everyone (without diminution) and no one can be precluded from enjoying them. This is especially true when the person enjoying the amenities is a “non-user,” i.e., one who values, say, knowing that groundwater is protected but never anticipates using that water (Duke and Johnston 2008). Some nonuser values are found to decay with distance while others appear immune to such decay. This complicates efforts to identify fully the population enjoying amenities and to measure, correctly, the spatial patterns of value. Policy makers will thus have difficulty identifying the full set of beneficiaries associated with preservation.

Are amenity values valid beyond the locality where data were collected? Some inconsistencies in amenity-value patterns have been documented (Irwin et al. 2003; Bergstrom and Ready 2005), and this seems to suggest that amenity

values are highly site-specific (Legg 2007). This is intuitive – the housing market is driven by the maxim, “location, location, location,” so the amenity market should be, too. Population characteristics, geography, and local scarcities in land use will affect values measured at different locations. Residents in Rhode Island may value habitat provision from farmland preservation more than those in Delaware, whose interests are tied to water protection and perpetuating farming as a way of life. Similar stories could explain why values vary between local regions, states, or even countries.

However, this complicates the use of amenity values because it limits the broader applicability of applied research. Valuation research is a reasonably expensive undertaking, and efforts would have to be increased by many orders of magnitude if all existing preservation programs required amenity valuation measures of their own. One possible solution to this policy problem is “benefit transfer,” or adapting existing research results to new contexts (Rosenberger and Phipps 2007). This research suggests that transferring values will be most accurate when the preservation sites are similar, i.e., the data were collected on a parcel sharing land market, population, and geographic characteristics with the parcel of unknown amenity value (Rosenberger and Phipps 2007). In addition, the likelihood of accurate transfer likely increases when the scale of preservation is similar, i.e., a community in one state was studied and values are being transferred to a similarly sized community.

Do amenity values reflect the variety of preferences? A recent methodological advance, mixed logit econometric analysis, allows for amenity-value estimation that reflects the variety of preferences in a population. For instance, researchers now can estimate, say, that 70% of the population holds a positive value for dairy farm amenities, while 30% holds a negative value. Policy makers will increasingly find researchers reporting these more nuanced, more accurate, characterizations of amenity value. It will be a challenge for policy makers to determine how best to use these results to design policies.

Implications for Policy

The preceding section clarifies the current state of amenity valuation research and offers some ideas for bridging the research-policy gap. This section explores the question, “What is to be done with amenity values?” This question has received minimal treatment from researchers, but with a proper understanding policy makers can appropriately employ amenity value measures to improve policy.

How should amenity values be used in benefit-cost analysis? Amenity values are typically presented as the benefits of preserving an acre (or hectare) of farmland with certain attributes (land use, risk of development, etc.), i.e., \$X/acre. Economists probably anticipate that policy makers will then conduct a single-parcel, benefit-cost test. If preservation costs \$Y/acre, then preservation is efficient if benefits exceed costs ($\$X > \Y). If there are multiple parcels, economists would encourage policy makers to rank each parcel in terms of its benefit-to-cost ratio and then select the parcel with the largest ratio (Duke and Johnston 2007).

However, many policy makers probably want to know how much land should be preserved in total, across the jurisdiction, and amenity value research cannot offer much guidance. Amenity value estimates are applicable to the next few parcels preserved. Large preservation efforts involving many parcels will generate amenity values that are less than the research calculated. The law of demand tells economists to expect lower values, but economists have little or no understanding of how fast they will drop. There are several implications for policy. First, amenity values are best used for benefit-cost tests or prioritization. Second, additional measurement should be conducted after any major preservation effort has been implemented.

What preservation policy should be used? Amenity values should not automatically direct policy makers to PACE. There is an urge to do so, probably because per-acre benefit measures are so easy to compare to the per-acre cost estimates for PACE with which policy makers are familiar. But there are economic and philosophical problems with this.

Economically, research finds that people also may value the preservation policy process itself (Johnston and Duke 2007). Amenity values may depend on whether they are delivered via PACE, by outright purchase of the land, or by conservation zoning. Amenity values may also depend on whether governments or private land trusts provide preservation. Although conservation zoning tends to generate the lowest preservation benefits, it will also tend to be the least expensive (Johnston and Duke 2007). In addition, Seidl et al. (2007) show that achieving preservation with three different tax policies and a zoning policy can have very different, important financial impacts on communities. Policy makers thus should carefully evaluate the various means of reaching preservation goals and not automatically exclude the possibility of using regulations.

Philosophically, there is a danger that policy makers will treat amenity values as indisputably objective simply because they are precise and generated through a complicated, statistical process. Yet amenity values are calculated using a process with subtle value judgments. Valuation researchers pose survey questions in terms of a respondent's willingness to pay for amenities because it has been shown to be the best way to ask about hypothetical market behavior. However, this does not mean that the public should be buying amenity services in all circumstances. Some policies, such as PACE, imply that development is a landowner's property right (Duke and Lynch 2006; Legg 2007). Actual land-use decisions, however, are largely directed by zoning. Zoning laws dictate permissible land uses at a given time; they do not necessarily define property rights.

It is a value judgment whether or not the public should take on a buyer-type role (PACE, fee simple) or a seller-type role (impact fees) in preservation transactions (Duke and Lynch 2006; Legg 2007). Similarly, it is a value judgment whether current land-use rules should be altered via rezoning. Policy makers are advised to seek the guidance of local political bodies and stakeholders in making these judgments. Amenity values from economists can help suggest priorities, but should not automatically and uncritically be used to dictate a specific policy process.

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The Northeast Center receives annual base funding through the Cooperative State Research, Education and Extension Services, U.S. Department of Agriculture and the Northeastern Regional Association of State Agricultural Experiment Station Directors. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture, or of other funders.

