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# The Multifunctional Attributes of Northeastern Agriculture: A Research Agenda

Sandra S. Batie

In the United States' Northeastern region, there is an increasing interest in the public benefits from agriculture. These benefits are frequently referred to as multifunctional attributes. The policy challenge is to find an effective way to reflect these public demands so that multifunctional agriculture can be profitable. There is a significant research agenda that accompanies this challenge. Research topics include assessing and understanding consumer demand for multifunctional attributes, estimating the long-run returns to those production systems which supply these attributes, and designing and evaluating institutional arrangements to supply them.

*Key Words:* farmland protection, land use policy, multifunctional agriculture

As the Northeastern region of the United States becomes increasingly urban, there is an attendant interest in the beneficial attributes associated with agricultural landscapes. Agricultural enterprises can offer public benefits such as the provision of improved water quality, wildlife habitat, landscape amenities, flood control, nutrient recycling, and carbon sinks. Sometimes the definition of agro-benefits is stretched beyond public goods to include the production of wind energy, water harvesting, or food security (Aldington, 1998; Dobbs and Pretty, 2001; Harwood, 2001; Josling, 2002). Agriculture can also provide opportunities for hunting, agro-tourism, and agro-entertainment, as well as being associated with regional identity, heritage values, and rural vitality and ambience.

The European term for these relationships is “multifunctional agriculture.” While not precisely defined, the term is used to contrast these—mostly nonmarket—benefits from agriculture with the market benefits from the provision of raw materials for the food and fiber industry (Josling, 2002).

The European multifunctional paradigm challenges the market-oriented paradigm with respect to the role of agriculture in the modern economy (Josling, 2002). Indeed, multifunctionality is sometimes viewed as a foundation for the “European model of agriculture” (Potter and Burney, 2002). This European concept of agriculture—which, of course, is not held by everyone in Europe—draws its lessons from a more holistic view of systems and sustainability (Josling, 2002). Supporters of multifunctional agriculture argue that such an agriculture “is rich in diversity and traditions, intent on preserving the countryside, a living rural world that offers rural employment” (Barthélemy, 2001).

In Europe, agricultural policy frequently garners more public support when it is tied to broad social objectives rather than only production objectives. Furthermore, because the market commodities will not reward farmers for the production of most multifunctional attributes, European supporters of multifunctional agriculture advocate a public role for incentives. This support translates into agriculture policies which provide assistance to farmers for the provision of multifunctional attributes (Potter, 1998). An example is public compensation of farmers for the loss of market revenues because the farmers provided more wildlife habitat (Dobbs and Pretty, 2001; Libby, 2002; Potter, 1998).

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Sandra S. Batie is Elton R. Smith Professor of Food and Agricultural Policy, Department of Agricultural Economics, Michigan State University.

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There are also some markets which do reflect these public preferences. For example, some Europeans have demonstrated that they are willing to pay for food attributes such as “sustainably grown” (Moon et al., 2002), or such as having a food with a regional identity (e.g., regional cheese).

The Northeastern region of the United States has shown an increased interest in multifunctional attributes from agriculture. This interest is predictable. As incomes rise, multifunctional attributes are increasingly valued; i.e., the income elasticity for multifunctional attributes is higher than that of traditional food and fiber. Furthermore, the more populated regions of the country are most concerned with protecting multifunctional rural amenity attributes (Hellerstein et al., 2002). When rising incomes are combined with more urban values, the demand for multifunctional attributes from agriculture increases (Schweikhardt and Browne, 2001).

Much of the economic literature and debate with respect to multifunctional agriculture is related to trade issues. A key concern is whether European attempts to protect multifunctional attributes are merely disguised barriers to trade (Blandford, 1999; Blandford and Boisvert, 2002; Bohman et al., 1999; Dobbs and Pretty, 2001; Orden, Paarlberg, and Roe, 1999). Certainly, in some cases, multifunctional agriculture programs may be motivated by mere protectionism (Peterson, Boisvert, and de Gorter, 1999). Yet, there are valid demands for multifunctional agriculture (Potter and Burney, 2002).

In addition, there are non-trade distorting ways to pursue multifunctional agriculture (Blandford and Boisvert, 2002; Bohman et al., 1999). However, the trade issues are not the focus of this article. Rather, in this paper, I will explore the concept of multifunctionality and how it relates to the changing nature of Northeastern U.S. agriculture, as well as implications for policy-relevant research.

### **The United States and the Concept of Multifunctionality**

While the use of the actual word “multifunctional” is quite limited, there is considerable, but circumstantial, evidence to show the concept of multifunctionality is gaining acceptance in the United States in general and in the Northeast region in particular. There are at least three major types of evidence in support of this concept: (a) the growth in related public policies, (b) the growth in related research, and (c) the growth in related market and nonmarket demands. This evidence is fragmentary;

however, taken together, it appears to reflect a growing interest of society for a different relationship with agriculture and with farming systems than has historically been the case.

### *Public Policies*

In the United States, public policies that focus on the connection of farmland with other valued attributes have been increasing. Certainly there has been significant increased policy attention to agro-environmental “harms” at the local, state, and federal levels. In addition, there has been an increase in the number and funding of programs to compensate farmers for agro-environmental improvements. The 2002 Farm Bill, for example, contains such programs as the Wetlands Reserve Program, the Conservation Security Program, and the Environmental Quality Incentives Program (Ervin and Casey, 2002). Moreover, public agencies and private conservation organizations are cooperating to purchase conservation easements from agricultural land owners—frequently aided by the incentives provided by favorable federal and state income and property tax laws (Mullarkey, Cooper, and Skully, 2001).

The considerable interest in the contribution of agriculture to the provision of open space and attendant benefits is also evidenced by support of policies to protect these benefits from urban development forces. A recent study of state and local open space protection policies by the Brookings Institution (Hollis and Fulton, 2002), for example, notes a “dramatic surge in both the creation and the enhancement of open space programs in the last 10 years. Thirty-two of the 50 states have created new programs or have significantly enhanced existing ones since 1999; of these, 21, or 66 percent, are among the most rapidly urbanizing states in the nation.”

Because of their more urban nature, it is not too surprising that all of the Northeastern states have open space and/or agricultural conservation programs. Maine, Rhode Island, New Jersey, New York, and Delaware all had major funding increases in these programs since 1999 (Hollis and Fulton, 2002). The top eight states in self-funded farmland protection programs in 2001 were all Northeastern states, with the one exception of Colorado. Eight of the 10 most active counties in farmland protection were in Northeastern states (Hollis and Fulton, 2002). Also, it appears that the Northeastern states’ programs are more focused on attributes stemming uniquely from agriculture (Hellerstein et al., 2002).

### Research

Other evidence suggesting there is an increased demand for multifunctional attributes of agriculture is demonstrated by the enhanced interest of university researchers in the topic. For example, Lyson, Torres, and Welsh (2001) investigated the relationships between the type of local agriculture and the attendant welfare implications for rural communities. Lyson (2000) delineated the characteristics that suggest a more “civic agriculture.” These characteristics include concerns about high quality, value-added products which are oriented to local markets, are smaller in scale, and rely on site-specific knowledge to protect the environment. “Civic agriculture” bears a strong resemblance to the European model of agriculture and the multifunctional paradigm.

As another example, the University of California’s Sustainable Agricultural Research and Educational Program is investigating community food systems, which include not only access to adequate, affordable, and nutritious diets, but also local and sustainable food production, processing, and consumption. Yet another example is the Northeast Research Project (NE-180), titled “Consumers, Commodities, and Communities: Local Food Systems in a Globalizing Environment.” This project identifies 10 indicators of “foodshed sustainability.” These indicators include environmental issues and protection of the agricultural resource base, as well as food security and food access.

### *Growth in Market and Nonmarket Demands*

Other evidence of societal interest in multifunctional attributes from agriculture comes from emerging and expanding market and nonmarket institutions throughout the country. These arrangements include: (a) the growth of market demand for organic food of over 20–25% per year (Dimitri and Greene, 2002); (b) the success of retail stores, such as Wegman’s, which promote the connection of retail food with communities and producers; (c) the growth of regional labels, such as those provided by the Food Alliance in the Northwest; (d) the growth of ecolabels, such as California Clean; (e) the rapid growth of agro-tourism or agro-entertainment opportunities; and (f) emerging markets for sustainable agricultural and forestry products (Batie, 2001).

Even the New York Catskills Watershed Agricultural Program, designed to ensure a potable water supply for New York City, while protecting the livelihoods of farmers in the watershed, appears to

speak to a renewed relationship of society to agriculture and the multifunctional benefits associated with agriculture (National Research Council, 2000). Similarly, the increase in farmers’ markets near population centers provides viable ways for some farmers to grow new crops and to market them in new ways (Heimlich and Anderson, 2001).

Societal interest is also reflected in the increasing attention given by various nongovernmental organizations (NGOs) and foundations to the relationship of agriculture to multifunctional attributes. NGOs include those that focus on farmland protection (e.g., American Farmland Trust), those that provide consumer information (e.g., the Organic Alliance or the Slow Food Movement), those that promote sustainable agriculture (e.g., the Land Institute), those that focus on community (e.g., Community Alliance with Family Farmers), those that promote ecolabels (e.g., Salmon Safe), and those that focus on food safety and security (e.g., Growing Gardens). Two foundations showing considerable interest in the relationship of society to food and to agriculture are the Joyce Foundation and the W. K. Kellogg Foundation. Both have recently supported projects linking farming systems with various environmental and community benefits.

### **Northeastern Agriculture and Multifunctional Attributes**

Over time, Northeastern agriculture has undergone many transitions (Carpenter and Lynch, 2002), including the relatively recent emergence of demands for multifunctional attributes. Three basic types of rural land uses have emerged (Dunn, 2002).

The first is characterized as poorer location, lower quality lands which tend to be forested. While they are scenic, and as such tend to be good recreational and summer home locations, they generally are not of high enough land quality nor are they situated in locations with the potential to offer significant profits for agricultural purposes.

The second rural land use type is high quality land which is well located and is comprised of livestock enterprises that currently are consolidating. Two-thirds of the mid-Atlantic region’s total sales are from livestock (Carpenter and Lynch, 2002). This land is most likely to be used for large-scale dairy, poultry, or hog production. These farms also tend to be under considerable pressure from encroaching development. Not only do land prices rise with development pressures in these situations, but conflicts abound as neighbors complain about “factory

farms,” odor and flies, degraded water quality, and animal welfare.

The third type of rural land use is characterized as high quality, well-located land which is transitioning either into high-valued agricultural enterprises or which are moving away from being “production agriculture” locations to a locus of “consumer-responsive agriculture” enterprises. Lapping and Pfeffer (1997) argue that the shift to higher value products is occurring with Northeast agriculture—particularly in agriculture near cities. Most of the land in the Northeast is rural land with continued agricultural production (Carpenter and Lynch, 2002). But, in contrast to much of the rest of the nation, the Northeastern farms—especially those in the rural-urban fringe—are more specialized in the production of higher valued products, are smaller, and make more intensive use of their resources than any other region in the United States, and sell more products directly to consumers (Carpenter and Lynch, 2002).

A trend toward higher valued products is particularly noticeable in those mid-Atlantic states where livestock sales are declining. In these states, there has been the largest increase in sales per acre in the region. Delaware, for example, has had the highest average per acre sales in the region since 1974; in 1997, Delaware sales averaged \$1,192 per acre (Carpenter and Lynch, 2002). New Jersey is second highest with \$838 per acre, and Maryland is third at \$609 per acre. All three of these states have experienced substantial declines in their dairy industries since the 1950s (Carpenter and Lynch, 2002).

Consumer-responsive enterprises are those higher valued products and services produced and designed with end consumers in mind. Food crop examples might include mushroom production, greens, herbs, maple syrup, wine, and organic vegetables. Animal crops include horse, goat, llamas, free-range organic chickens and eggs, venison, and even fish.

With respect to Northeastern farms in rural-urban fringe areas, Lapping and Pfeffer (1997, p. 97) note: “The largest declines are in dairy and poultry production, and the greatest increases are in farms that sold mostly other animal products, mainly horse farms.” Other products can be wood chip bedding or alfalfa hay for horses, cut flowers, bedding plants, jellies, and pies. Services might include horse boarding and training, farm vacation tours, wine tasting, and school field trips (Lapping and Pfeffer, 1997).

A hypothesis is that it is this third type of agriculture which is most likely to be the target of the demand for multifunctional attributes. Many of these farms are going to be near urban centers, and hence

subject to rising opportunity cost of land. These types of farms tend to be found in areas undergoing serious transitions in the main source of farm income.

[W]ithin the Northeast, large parts of the metropolitan agricultural community are actively developing alternative models of farm organization that depart from the highly specialized, government-supported and -regulated agricultural system that for so long has dominated the national food system. The diversification of farm operations and production is geared to specific market niches offering premium price opportunities in rural/urban fringe areas (Lapping and Pfeffer, 1997, p. 97).

These farms are also undergoing significant challenges with respect to profitability. Yet, for the most part, they appear to represent an agriculture that people have been willing to tax themselves to preserve.

Many of these urban-fringe farms also appear to involve high risks, perhaps requiring high product prices to justify the investments placed in them. However, the economics of such transitions—including the conditions of long-term profitability for various enterprises—have not been well studied. The policy challenge is to find an effective way to reflect public demands for multifunctional attributes so that this type of agriculture can become more profitable. Such a challenge suggests a research agenda for agricultural economists.

### Implications for Policy-Relevant Research

To better understand the demands for multifunctional agriculture and to draw appropriate policy implications, there are important policy-relevant research needs to be addressed. These are discussed below.

- *To assess and understand the trends in consumer demands—both market and nonmarket—for multifunctional attributes stemming from agriculture.*

Aldington (1998) distinguishes among three major types of “multiple functions” of agriculture: (a) the food security function, (b) the environmental function, and (c) the socioeconomic function. Socioeconomic functions involve the provision of income and employment, particularly to assure the viability of rural communities. Aldington notes that these functions can be complements (or even joint products) to one another, such as when the provision of a rural landscape has both environmental and socioeconomic attributes. Multifunctional attributes can

also be competitive. For example, food production can lead to the degradation of the environment.

Which of these functions are being demanded by the public when they support multifunctional agriculture? It would appear there are actually many demands for various functions nested together. The overarching goal is to preserve the countryside, but the preservation is desired for many reasons. These reasons can include the desire to maintain a more pleasing landscape, to protect the environment, to maintain local foods and local traditions, to protect small-scale agriculture, and/or to protest industrialized commercial agriculture and attendant land use patterns (Libby, 2002).

A recent survey of Kent County, Michigan, by Norris and Deaton (2002) demonstrates some of these points. Kent County is home to Grand Rapids, the state's second largest city. It is experiencing significant growth in development and attendant loss in agricultural lands. When survey participants were asked what values they associated with agriculture, responses included "farmland provides a sense of local heritage" (92%), "farmland provides open space" (91%), and "farmland protects water quality" (49%). When asked which farmlands should be included in a Kent County farmland protection program, the respondents answered "protect farmland with high environmental values"<sup>1</sup> (89%), "protect productive farmland" (87%), and "protect farmland next to highways" (45%).

The above results are similar to those of other studies. For example, Kline and Wichelns (1996), using factor analysis, identified the prime reasons for concern about Rhode Island farmland preservation to be related to environment, local food, rural communities, aesthetics, growth, and access to land. These reasons are not discrete, but rather are nested together; that is, they are perceived to be joint products stemming from certain farm enterprises.

The nesting of these concerns complicates policy design because finding an effective solution to the demand for one attribute (e.g., open space) will not necessarily result in satisfaction of the demand for another attribute (e.g., viable local food outlets). It may well be that the character of the rural economy is an important element in the nested demands, and therefore a program which subsidizes a farmer to reduce environmental harms from a confined animal feeding operation may do little to satisfy the other

demands. Or, as another example, if the public supports a farmland protection program because they believe it is meeting their set of "nested demands" for open space and for a small-scale, pastoral agriculture, then they are likely to feel "duped" if large-scale confined animal feeding operations begin to dot the landscape in the protected areas.

Demand analysis is further complicated by the spatial uniqueness of the demands. The provision of multifunctional attributes is unique to location and to the propinquity of other activities. For example, one farm protected for a "viewscape" is more valuable if the neighboring farms are also so protected. Furthermore, the costs and benefits associated with the provision of multifunctional attributes will be spatially varied, as will the link with agricultural production. Some areas will be better suited to the provision of ecological services, or the demand for rural amenities will probably be stronger around metropolitan areas [Organization for Economic Cooperation and Development (OECD), 2001]. Some areas closer to urban centers may be more valued for certain multifunctional attributes than are others. Thus, an important research question is: What regional differences exist with respect to demands for multifunctional attributes?

Other important research questions to be considered are: (a) How important are site-specific differences in the "joint production" of multifunctional attributes? (b) What is the spatial dimension of the various multifunctional attributes? and (c) How do spatial factors influence the cost of supplying, multifunctional attributes? (OECD, 2001).

There can also be important scale differences between the provision of the multifunctional attributes and the resulting benefits or costs. For example, the scale that is relevant for surface pollution can be different than the scale for groundwater; similarly, the relevant scale will be different for landscape amenities versus rural employment (OECD, 2001).

The link of multifunctional attributes to agriculture is also in need of more careful investigation (Hellerstein et al., 2002). The political debate frequently assumes the provision of multifunctional attributes is directly proportional to the provision of commodity outputs, but such a relationship is not usually true (Blandford and Boisvert, 2002; Mullarkey, Cooper, and Skully, 2001). To what extent and at what comparative price can some multifunctional attributes (such as open space) be provided by nonagriculturally linked activities? (OECD, 2001; Bohman et al., 1999). Is agriculture merely an instrument to achieve many multifunctional attributes, or

<sup>1</sup> High environmental values were defined in the study as those associated with soil erosion, wildlife habitat, and surface and groundwater quality.

is the protection of agriculture integrally embedded with these other demands?

Further, there appears to be a tradeoff between protecting lands which are most likely to remain in farming (e.g., flat and fertile) and protecting those lands having a more desirable set of multifunctional attributes (e.g., hilly, pastures, unique landscapes) (Hellerstein et al., 2002). What is the nature of these tradeoffs and how can a proper balance be achieved?

There is need for empirical research focused on estimating the demand for multifunctional, non-commodity attributes. Much of the existing research addresses farmland protection. While there has been research on the willingness to pay for farmland protection (e.g., Bowker and Didychuk, 1994), and research on public perceptions with respect to farmland protection (e.g., Kline and Wichelns, 1996, 1998), there have been few studies differentiating which farmland the public was interested in saving (Deaton, Hoehn, and Norris, 2002; Hellerstein et al., 2002).

- *To estimate the long-run returns to production systems that provide these multifunctional attributes, and to use this information to identify where there is a need for public programs and policies that reflect consumer demands for multifunctional attributes.*

There is a need for research which investigates the long-run viability of agricultural producers supplying multifunctional attributes such as wildlife hunting, ecotourism, agro-tourism, or more direct marketing (e.g., alfalfa hay to horse owners). A better understanding of the potential and emerging opportunities, and the threats to farm survival in various regions and by types of farm, would help to clarify where there are “missing markets” for multifunctional attributes. This analysis in turn can be used to identify where there would be public support for public-sector or nongovernmental organization programs and policies to better reflect consumer demands for multifunctional attributes. Such an analysis would also clarify the financial requirements of farmers to fulfill these nonmarket demands.

- *To analyze the applicability of (plus limitations of) private-led, NGO-led, and public sector-led (and public-private partnerships) efforts to supply multifunctional attributes.*

The current set of policies influencing agriculture is, for the most part, not well designed for the provision of multifunctional attributes. The Farm Bill

policy, for example, reflects these demands in only a minor way. The main influence of the Farm Bill is to influence the behavior of an increasingly smaller set of commercial crop farmers; it is not to provide multifunctional attributes. The conservation and environment programs have been historically quite small in comparison to the commodity title, and they tend to have multiple, nontargeted objectives (Batie, 2001). In addition, federal environmental policies addressing agro-environmental problems have attended mostly to the environmental harms that come either from habitat destruction or from large-scale animal feeding operations.

Local and state programs have had spotty records, and rarely seek to integrate land use and community economic policy in a manner that recognizes agriculture as an important activity (Lapping and Pfeffer, 1997). Still, it has been the state, local, and NGO programs (e.g., private land trusts) on farmland protection programs, differential farmland tax assessments, agricultural districts, agricultural zoning, and community supported agriculture (CSA) that have attempted to “solve” the “missing markets” problem. There is certainly room for more analysis of these programs as well as analysis of innovative new programs, including a significant reorientation of the national agricultural policy to ensure capture of multifunctional benefits.

Thus, policy analysis should include investigations into how various programs actually performed with respect to their desired final objectives. For example, no consensus appears to have emerged, either in the United States or in Europe, to suggest the pursuit of multifunctional agriculture is adequate environmental policy (Josling, 2002). Is environmental diversity actually enhanced by wildlife habitat programs directed at farmers? Do rural communities really gain when local agricultural enterprises are assured of financial viability? What changes would need to be made in the design of existing or new programs to better achieve these objectives? When are various multifunctional attributes in conflict?

## Summary

While there is considerable evidence to indicate there are unmet public demands for multifunctional attributes, the demand for and supply of these attributes have not been well investigated. Neither the traditional, government supported, nor deregulated agricultural markets can be relied on to provide most multifunctional attributes. Furthermore, the

appropriate institutions to supply these “missing market” functions are still evolving. More research addressing the cost-effectiveness of these existing institutions, and the design of alternative institutions, would be useful as guidance to policy makers and NGOs interested in obtaining more benefits from agriculture.

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