To the Graduate Council:

I am submitting herewith a thesis written by Amy Sue Hill entitled "Fields with Dreams: The Distribution of Farmland with Publicly-Funded Conservation Easements in Pennsylvania." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Geography.

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Fields with Dreams:
The Distribution of Farmland with Publicly-Funded Conservation Easements in Pennsylvania

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Presented for the
Master of Science
Degree
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Amy Sue Hill
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ABSTRACT

Conservation easements have played an increasingly significant role in the American movement to preserve farmland from urban development. Conservation easements are legal instruments that enable a landowner to sell his right to develop his property to an outside party, typically a government entity or a private land conservancy. The distribution of conservation easements used to preserve farmland is highly variable. Conservation easements often are found in regions where productive farmland and intense development pressure collide. Conservation easements are most common in places where both public and private sectors give strong financial and political support for conservation.

This thesis analyzes the spatial variability and effectiveness of conservation easements purchased as part of Pennsylvania's public farmland preservation initiative. Many of Pennsylvania's counties, particularly those in the southeast, have experienced significant population growth in the past three decades. These same counties comprise the core of Pennsylvania's agricultural land and economy. In response to farmland loss, citizens have given strong political support to state and county boards created to preserve farmland through the purchase of conservation easements.

An examination of conservation easement locations reveals that their distribution is notably uneven in Pennsylvania. My research confirms that urban development pressures and the strength of the local agricultural economy influence the lopsided usage of conservation easements. Principle components analysis of eighty-four variables for sixty-six counties demonstrates that conservation easements are purchased more

frequently in counties where expansion of urban land uses conflicts with economically productive agricultural land. The research tests the model produced by principle components analysis through the comparison of counties' component scores to the proportion of farmland they have preserved with conservation easements.

My research further explores the factors affecting the use of conservation easements through an evaluation of Lancaster County's geographical situation and its conservation easement purchase program. The study reveals that local support, religious attitudes, and the implementation of other farmland preservation methods influences the success of the Agricultural Preserve Board.

This thesis explains why certain counties in Pennsylvania are committed to the use of conservation easements while others are not. The study provides a geographic interpretation of the public purchase of conservation easements as a method for preserving farmland in Pennsylvania. The study can serve as a model for others interested in public land protection in the United States.

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CHAPTER ONE

Introduction

Flipping through television channels can have unexpected value. Take, for instance, a recent snippet from one of the larger home shopping networks. The host was describing a porcelain painted teapot with a barn and surrounding fields. Her commentary, surprisingly, touched on quite a few geographic issues central to the rural-urban fringe. "This reminds me of Pennsylvania. It seems like no matter where you drive you can always see a barn and fields in the distance. Like my drive home from work, its very nice and peaceful."

The large home shopping network that employs the host is based in southeastern Pennsylvania, and her appreciation of the area's farmland is not atypical for suburban residents of the region. While she is likely not economically or socially tied to farms or farm life, her enjoyment of the pervasive agricultural landscape is obvious. Her commentary does not hint at a growing regional anxiety over the future of Pennsylvania's farms. That such trepidation is in the minds of many Pennsylvanians shows in the political support they give to the Commonwealth's conservation easement purchase program. The program has preserved more acres than any other public or private farmland preservation effort (Pennsylvania Department of Agriculture 2003).

Only rarely have Americans felt it necessary to keep privately owned landscapes safe for enjoyment by future generations. Many unique natural features, such as the Yellowstone caldera or the Yosemite Valley, have had champions for several hundred

years. Protection of other unique natural areas that provide scenic views and public recreational opportunities, including state forests and county parks, soon followed. Americans have found it desirable in the last thirty years to preserve large amounts of privately owned land to which the public is denied access. The preservation of open space is a popular political mandate in urban and urbanizing areas across the nation.

The debate over the preservation of farmland has become particularly lively. Farms have disappeared gradually from many American landscapes where they once occupied the majority of visual space. The reasons for the decline of the farm acreage are myriad, but many Americans prefer that agriculture remain viable. While several tools are available to limit urban development of farmland, publicly-funded conservation easement purchase programs have become an accepted way to protect farmland threatened by expanding urban and suburban areas. These programs are found at the state, county, and municipal levels in particular areas across the nation. Farmland on which a perpetual conservation easement exists is considered preserved because urban development is prevented.

In this thesis I examine spatial aspects of Pennsylvania's conservation easement purchase program by assessing the social and economic factors that spark political action. This investigation begins with discussions of the processes of land conversion from rural to urban and the development of the farmland preservation movement. Once the national movement is analyzed, I conduct an appraisal of Pennsylvania's conservation easement purchase program at the state and county levels (Figure 1.1).

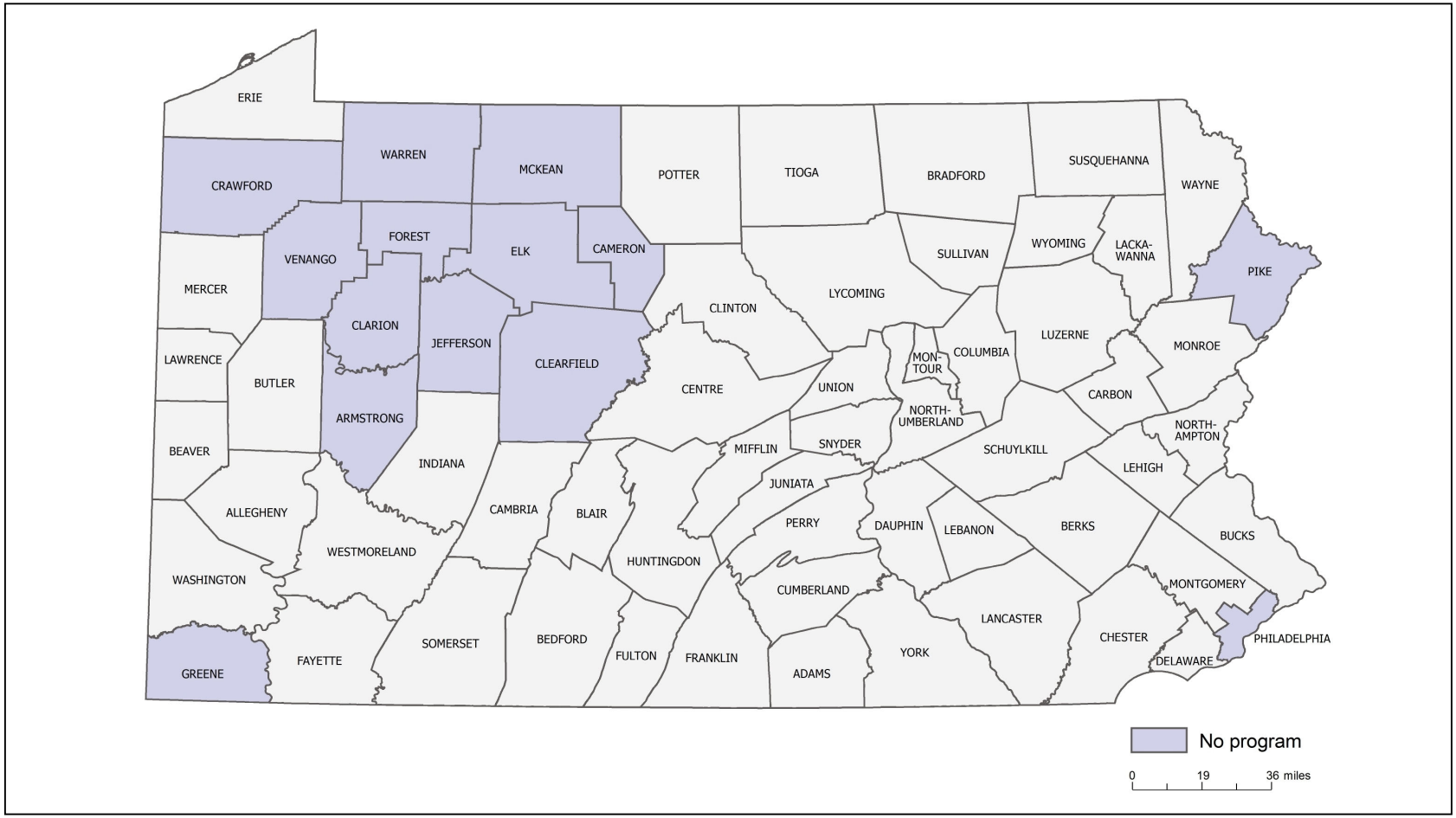


Figure 1.1. Pennsylvania Counties with State-Certified Programs that Purchase Agricultural Conservation Easements.
Source: Pennsylvania Department of Agriculture, 2003.

Pennsylvania is a good laboratory in which to examine conservation easements. The state has taken a leading role nationally in aggressive funding of conservation easement purchases at the state and county level. In the southeast, some of the most productive non-irrigated cropland in the United States exists in close proximity to quickly expanding urban areas. Other areas of the state, particularly the northwest, have little interest in urban expansion's impact on farmland conversion. The widely varying levels of interest in conservation easement purchases in Pennsylvania help to identify factors that are important in program participation. Through analysis of qualitative and quantitative data, I test several hypotheses related to the distribution and success of conservation easement purchase programs in Pennsylvania. I hypothesize that the uneven spatial distribution of participation in conservation easement purchase programs is influenced by urban development pressure and by the location of productive farmland.

In Chapter Two, I examine the concepts of property rights and the family farm as two central factors of American culture that influence farmland preservation. These concepts play a central role in the development of American land use policy. An analysis of these concepts is followed by an examination of the broad range of federal policies and laws that affect land and its conversion from one use to another. The development of the national farmland preservation movement and the use of conservation easements as a tool for farmland preservation are analyzed.

In Chapter Three, I place Pennsylvania in the historical context of settlement and land use change from the colonial era to the present. I show how the distinct geographical and historical conditions of the Commonwealth translate into a legal

framework for agricultural land preservation. I also discuss the multi-faceted approach to slowing farm loss that Pennsylvania has developed. I rely heavily on the Commonwealth's laws, policies, and program guidelines to identify variables that are responsible for the spatial distribution of preserved farmland.

In Chapter Four, factors influencing the uneven distribution of conservation easement purchase programs and preserved farmland are analyzed. Data sources include the Census of Agriculture, the Census of Population and Housing, and the Pennsylvania Department of Agriculture and other Commonwealth agencies. I perform principle components analysis to identify statistically significant factors in order to predict a county's participation in the Commonwealth's conservation easement purchase program. The results are tested through the comparison of counties' component scores to the proportion of farmland they have preserved with conservation easements.

Chapter Five is a case study of Lancaster County (Figure 1.1). As a top purchaser of conservation easements in the nation, the dynamics of farmland preservation in Lancaster County are suitable for detailed study (American Farmland Trust National Assessment of Agricultural Easement Programs, 2004). The chapter analyzes Lancaster County in relation to the component analytic results detailed in the previous chapter. The analysis explains several mischaracterizations through an investigation of Lancaster's geographic situation at the edge of a national metropolis, its unique cultural composition, its conservation easement purchase program, and the distribution of its preserved farmland. The case study also investigates other farmland preservation methods within the county, including agricultural zoning, agricultural security areas, and private land trusts. The analysis concludes that an effective farmland preservation program requires a

comprehensive approach, addressing urban growth issues as well as preservation of individual farms.

In the final chapter, I speculate why certain counties in Pennsylvania are committed to the use of conservation easements while others are not. In addition, I discuss the effects that conservation easement purchase programs have on urban fringe landscapes as they mature. My research is vital because agricultural land preservation policies will continue to play important roles in the future of urban fringe agriculture and in the organization of land uses in the urban fringe of American cities.

CHAPTER TWO

Farmland Conversion and Preservation in the United States

The concept of land ownership, along with the idea that ownership conveys rights, has shaped the settlement of North America from the earliest days of European exploration. Likewise, a variety of historical circumstances has shaped the broad views of property and land use regulation held by Americans. The role of local, state, and federal governments in land ownership issues has also undergone transformation. An investigation of the historical roots of American land ownership, land use change, and land preservation reveals sweeping changes in how average citizens and government entities view land as property.

Property Rights and the Family Farm

European conquest and colonization in North America marked the transfer of concepts of property ownership and property rights to a continent steeped in less formally structured modes of land allocation. To the Europeans, discovery of an area in the New World conferred ownership. Conflict arose in border areas and in areas where strong native claims to land existed. Conflicts reached resolution through wars, increasing numbers of settlers, treaties, and monetary purchases. The colonial period established mostly British, but also French and Spanish, roots of United States land laws.

From creation of the United States of America into the twentieth century, the federal government's primary role concerning land use was one of transferring the public domain to state and private ownership (Hellerstein et al. 2002, 5). Most federal policy conveyed land to small family farmers who worked the land and improved it. Thomas

Jefferson believed that yeoman farmers would provide moral fiber as well as foodstuffs for the new country. Federal policies also encouraged land speculators to amass large acreages and compile large fortunes. The Survey Ordinance Act of 1785, the Homestead Act of 1864, and other federal legislation conveyed real estate and property rights to landowners. Between 1785 and 1929, the United States government transferred 1.25 billion acres to its residents (Hellerstein et al. 2002).

Title is only one aspect of land ownership. Possession also includes the right to occupy, use, sell, and bequeath land. Since law both creates and defines property rights, changes in law may cause changes in rights. Property rights may also be divided. Property rights are often likened to a bundle of sticks because the owner of the title may sell "sticks" from the bundle within legal constraints. Mineral, water, and other types of rights are often sold separately from surface rights. Utility and transportation easements are established in this manner.

Private owners tend to become highly protective of the right to use, occupy, and enjoy their land (Olson 1999, 10). Property ownership and the freedom of individual property rights from governmental interference have long been key parts of the American character. When the United States was primarily a rural nation, the notion of property rights was inviolable. The institution of property rights gave individuals the primary power in land use decisions (Platt, 1996, 93). Regulation of the subdivision of land and the application of zoning ordinances are relatively recent developments, designed to remedy poor land transfer procedures, urban crowding, mixing of incompatible land uses,

and land abuse. Most government planning evolved as a reaction to the cumulative effect of poor individual decisions in land use (Platt, 1996, 93).

The idea of the family farm has played an important role in the development of popular opinion concerning farmland preservation. Many pundits declare the family farm dead. They are really declaring farming dead as a minor economic and subsistence activity. Most farms are still family-owned, even if they are incorporated for tax purposes (Olson and Lyson 1999, 183). Modern family farms have little resemblance physically and functionally to the farm of the Jeffersonian ideal. Even though most modern farm families grow specialized products and buy almost all of their food from grocery stores, the idea of the self-sufficient family farm remains a powerful cultural construct in American society. Scholars term the glorification of farms and farm life the agrarian myth. Succumbing to the myth, many Americans view farm life more wholesome than urban lifestyles. Agricultural land takes on cultural value in addition to its economic worth. Pennsylvania journalist Tom Knapp believes that state residents show growing agrarian sentimentalism toward farm life in the face of change (2002, 37).

Dixon and Hapke summarize five basic principles of agrarianism:

> (1) a belief in the independence and virtue of the yeoman farmer, (2) the concept of private property as a natural right, (3) land ownership without restrictions on use or disposition, (4) the use of land as a safety valve to ensure justice in the city, and (5) the conviction that with hard work, anyone could thrive in farming (2003, 144).

Dixon and Hapke place these ideas at the root of American culture and find that various groups have used one or more of the principles to support a variety of conflicting political causes. In the case of farmland preservation, agrarianism provides arguments both for

and against conservation easements. On one hand, conservation easements keep urban housing from subsuming America's farm heritage. On the other hand, the easements interfere with individual property rights.

The United States is noted for fierce protection of individual property rights (Olson 1999, 10). However, agricultural conservation easements, in which private individuals legally convey a subset of their property rights to the government, have gained widespread acceptance in certain areas. This situation is attributable, in part, to the dual justifications that agrarianism offers. Saving family farms is as morally justified as is preserving the integrity of property rights. The American legal system also plays a dual role. The law creates property rights and also serves as a guarantee against undesirable land uses on neighboring properties (Platt 1996, 95). A symptom of this dualism is the rising prevalence of negative attitudes toward undesirable land uses. The attitude often held by property owners is that noxious uses have to go somewhere, but "not in my back yard." This attitude is primarily urban because few persons care what their neighbors are doing until the effects of an activity are apparent.

Geographical Models of Land Use on the Rural-Urban Fringe

Persons are generally not interested in preserving agricultural land unless they perceive it to be in peril. The problem in the rural-urban fringe arises from the conversion of agricultural land to urban uses. Geographers have modeled changes in land use and value in the rural-urban fringe by simplifying physical environment and economic activity. In 1826, German farmer and classical economist J.H. Von Thünen published his isolated state model of land use (Sinclair 1967, 72). The model describes

how land use on a homogenous plain changes as distance from a theoretical city market center increases, using horses and carts as modes of transportation (Figure 2.1). Producers of the most profitable goods can afford land closer to the city market because they can pay the highest land rent. The less valuable products are located further from the city.

Von Thünen developed this model prior to the advent of major modern technologies, including railroads, the automobile, refrigeration, and highway systems. Von Thünen predicted that the city would be surrounded by a belt of intense dairying and market gardening. Farms locate immediately outside the city's boundaries to ensure delivery of fresh milk, eggs, and vegetables (Sinclair 1967, 75). A ring of woodland surrounds the intensive farm belt to satisfy the city's demand for lumber for construction and for fuel. More extensive land uses, such as grain farming and grazing of livestock, lie furthest from the city. A desert occupies the far reaches, making agricultural activity unfeasible (Sinclair 1967, 76).

Robert Sinclair, in his 1967 article "Von Thünen and Urban Sprawl," defines one of the first geographic models of agricultural land conversion in the face of urban expansion (Figure 2.2). In Sinclair's model, the built-up edge of the city is bounded by an area of small urban farms mixed with suburban housing tracts and commercial development. Farmers grow high-profit items that can be produced with a minimum acreage of land, including greenhouse produce, mushrooms, and nursery stock (Sinclair 1967, 81). The second ring is dominated by vacant land and land where grazing is permitted on short-term leases. Farmers generally continue limited operations while waiting for a profitable offer from an urban developer. In a third ring, transitory field

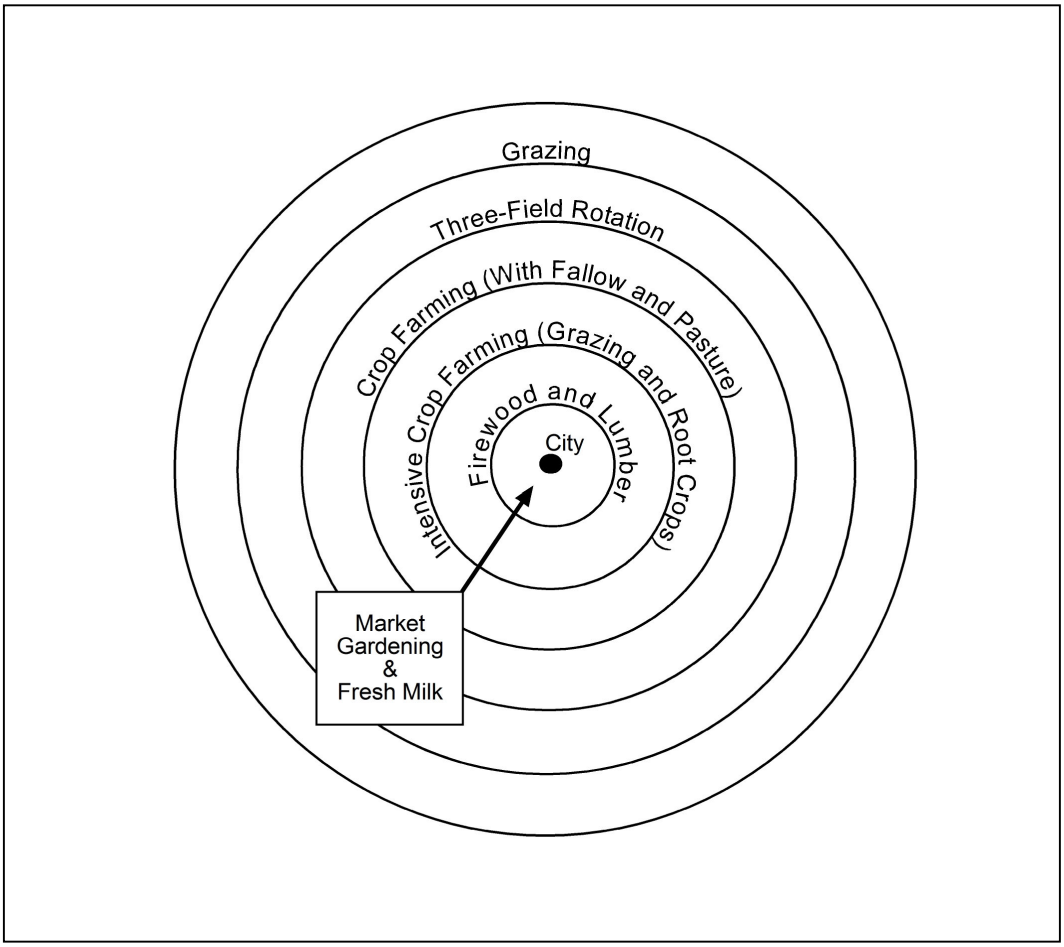


Figure 2.1. Von Thünen's Model of Land Use. Source: Sinclair, 1967.

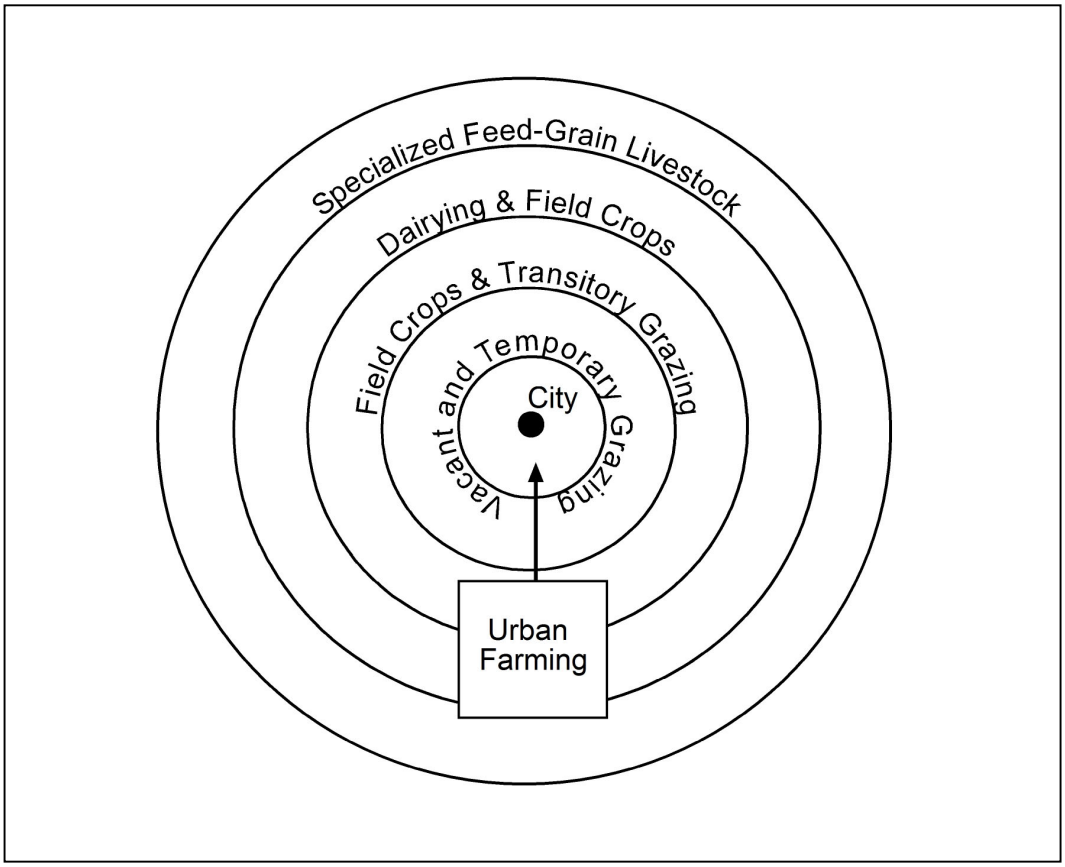


Figure 2.2. Sinclair's Model of Land Use. Source: Sinclair, 1967.

crops and grazing occur. This area is marked by limited long-term investment and by farmers beginning to anticipate land conversion to urban uses. Sinclair's final rings consist of an area of intensive dairy and field crop production followed by a zone of specialized grain-fed livestock. It is only in this last ring, typified by the Midwest's Corn Belt, that farmers are not directly influenced by urban growth (Sinclair 1967, 81).

John Fraser Hart explores the progression of agricultural land use change on the urban fringe more completely than Sinclair in "The Peri-Metropolitan Bow Wave" (1991). Hart describes the land conversion process succinctly by the changes in land use on a family farm on the fringe of New York City:

> The first generation, like its immediate forebears, practices dairy farming, and resents the encroaching urbanization. At least one member of the family has had to take an off-farm job. Finally the farm may switch from dairy to beef cattle, which require far less time, so that the entire family may obtain off-farm work. The second generation decides to intensify by growing vegetables, which are sold from a roadside stand because of lack of access to other marketing facilities. The third generation begins a nursery operation and, in time, may even build a greenhouse. The fourth generation sells the land and retires to Florida (49-50).

Hart emphasizes the movement of the urban frontier, likening it to a bow wave of a ship, marking the edge of urban development. Land conversion on the urban fringe is inevitable unless people are able to use political power to oppose the economic power of developers.

The Impermanence Syndrome and the Death of Farms on the Frontier

The causes behind farm failure on the urban frontier are collectively known as the "impermanence syndrome" (Olson 1999, 69). A hallmark of the impermanence syndrome is that once land conversion to urban uses begins, its effects accelerate the

process. Taxation of property is a fundamental component in land conversion. Municipalities, school districts, and counties collect tax on property. Assessors calculate property tax on land based on its market value, not the value of its current use. Even when governments provide tax relief, this facet of property taxation drives land use change. Farmers must pay taxes on the development value of their land, and values can be astronomical if the farms are close to a metropolitan area. Farmers may find relief in use-assessment taxation programs, where the government values the land according to its current use. High property taxes may cause an intensification of urban land use on non-agricultural properties. Isolated farms in use-assessment programs then fall victim to the impermanence syndrome.

Although urban encroachment may briefly energize the farm economy as the distance to markets decreases, encroachment eventually stifles agricultural production. Fragmented farm communities on the urban frontier are not able to produce adequate demand for infrastructure, including equipment sales and repair, feed mills, and veterinary services. Fragmentation leaves farmers open to complaints and nuisance lawsuits from their suburban neighbors, including ones concerning drifting dust and insecticides. Farmers have difficulty moving bulky equipment along the public roads that separate their dispersed owned and rented land.

Social and economic causes for impermanence include a shortage of capable young farmers. Many adult farm children within driving distance of an urban area become disenchanted with the hard physical labor and limited freedom that farm life entails. They can work less and earn more from employment in the urban area. Most

older farmers must hire laborers. Farmhands are hard to find on the urban fringe because employment is available in the urban area.

The Case for Farmland Preservation

Garrett Hardin, in his 1968 book *The Tragedy of the Commons*, brings attention to the process by which common goods, owned and protected by nobody, become over-used, sometimes to the point of obliteration. Hardin documents the manner in which thousands of small decisions related to land use can result in an effect that a community dislikes. Hardin's work is the basis of movements to protect communal goods, including the ones to preserve open land and farmland.

Scholars have found that farmland provides environmental, social, and economic benefits to the public. In rapidly developing areas, farmland helps to control run-off, increases groundwater recharge, and provides refuge for wildlife. Many Americans value farming because it represents the continuation of the nation's rural heritage. Others, falling under the spell of the agrarian myth, simply feel more wholesome if they know that farms are nearby and protected. Many urbanites like to buy produce from roadside stands and enjoy driving by fields of crops and pastures with cows.

Recently, city planners and public officials have reevaluated the relationship between economic growth, urban sprawl, and infrastructure. Traditionally, officials perceived new commercial and residential developments as bread and butter for a municipality's tax base. While keeping land in farms limits the tax base, studies have shown that providing public services to farmland costs significantly less than providing them to commercial and residential property. Since farmland requires fewer services,

some studies contend that farmers actually subsidize urban growth (American Farmland Trust Farmland Information Center 2004).

Richard K. Olson, an agroecologist with the Center for Sustainable Agricultural Systems at the University of Nebraska-Lincoln, finds that "as Americans observe what is happening around them to farmland and other resources, their conclusions as to the rightness or wrongness of these events are often based on each event's conformity to the principles of capitalism" (1999, 10). Others believe that to fully understand the value of farmland, one must recognize that a parcel has worth beyond the economic rewards reaped from agriculture (Table 2.1). The problem is that assigning a dollar value to public benefit is nearly impossible. Should farmers charge a fee for each gallon of water returned to the water table or for each pleasant drive by their land? On the other hand, should farmers pay a fee for manure-spreading or for a car held up behind a tractor on a public road? Despite the absence of a precise system for assessing the contributions and detractions of farmland, more and more Americans concede that market value consistently fails to account for the benefits (Hellerstein et al. 2002, 7).

Federal Programs Affecting Agricultural Land

The federal government takes little action to preserve farmland. Nonetheless, federal policy has wide-ranging, conflicting, indirect effects on agricultural land and its preservation. Tom Daniels, a professor of geography at the State University of New York at Albany, notes, "Federal spending programs for roads and sewer and water facilities, and federal tax laws such as the mortgage interest deduction for homeowners have resulted in huge subsidies for sprawling development which consumes hundreds

Table 2.1. Non-Market Outputs from Agricultural Land.

Positive Outputs		
Environmental	*Social*	*Economic*
Open space	Traditional country life	Rural income and employment
Soil conservation	Small farm structure	Viable small-town communities
Biodiversity	Cultural heritage	Diversified local economy
Wildlife habitat	Community identity	Domestic food supply
Scenic vistas		Municipal budgeting for services
Flood control		
Groundwater recharge		
Recreational opportunities		
Isolation from congestion		
Watershed protection		
Negative Outputs		
Nuisance odors		
Nutrient/pesticide runoff		
Soil erosion		
Traffic safety hazards		
Nuisance noises		
Ecosystem fragmentation		

Source: Olson and Lyson 1999.

of thousands of acres of farmland every year" (1998, 2).

Federal legislation funds a variety of land preservation efforts, including the Farmland Protection Program. The study of federal agricultural and conservation policy from 1930 onward provides insights into the regulatory environment in which state preservation programs take root and grow. Lehman notes that only two attempts have been made to regulate agricultural land use at the national level, the first during the New Deal and the second during the 1970s (1995, 5). The Dust Bowl of the 1930s raised federal concern over land misuse. Farming practices resulted in severe soil erosion by wind and led to the formation of the Soil Conservation Service (Lehman 1995, 27). The Great Depression also marked the beginning of farm subsidies aimed at increasing agricultural prices, maintaining a steady domestic food supply, keeping farmers on their land, and alleviating rural poverty. Federal subsidies are contingent upon mandated conservation practices.

Environmentalists in the 1970s promoted the passage of federal legislation that addressed air and water pollution, use of herbicides and pesticides, disposal of solid and toxic wastes, and protection of endangered species. In 1973, Congress debated the Land Use Policy and Planning Assistance Act, which would have required each state to commission a state-wide land use plan. The 1973 act passed the Senate but lost by a slim margin in the House of Representatives (Lehman 1995, 77). No federal land use planning legislation has been seriously considered since.

In 1969, the National Environmental Policy Act was passed by Congress. The act requires that any federally-funded project conduct an Environmental Impact Statement (EIS) before it takes an action that significantly impacts environmental quality. An EIS

requires identification of the direct and indirect environmental impacts of a project. The statement must also consider alternative choices, one of which must be a "no-build" option that assesses the impact of doing nothing (Olson 1999, 105).

In 1981, the United States Department of Agriculture conducted an extensive research project, the National Agricultural Lands Study (NALS). The study found that America was quickly running out of agricultural land and would face domestic food shortages in the foreseeable future (Lehman 1995, 133). Federal policy makers began to consider farmland preservation as a way to stabilize the food supply. Scholars in the private domain contested the study's findings, claiming the use of biased data and techniques. Several of the researchers on the NALS left the Department of Agriculture to form the private non-profit American Farmland Trust (Lehman 1995, 158). While discredited in the eyes of many, the NALS sparked the passage of the Farmland Protection Policy Act of 1981, which is structurally similar to National Environmental Policy Act (Daniels, 1998, 1).

The Farmland Protection Policy Act recognizes that federal programs often contribute to farmland conversion and requires that federal agencies gauge the impact of their actions on farmland conversion. While sounding impressive, the National Environmental Policy Act and the Farmland Protection Policy Act have dull teeth. Both require only procedural completeness. If an agency, after identifying all alternatives and impacts, still wishes to pursue a course which would have dramatic negative environmental effects, or would develop or flood farmland, no legal challenge can be mounted based on either act (Olson 1999, 106). The Farmland Protection Policy Act is somewhat weaker than the National Environmental Policy Act because under it only a

state governor can bring legal action against an agency that fails to meet all procedural requirements (U.S. Department of Agriculture 2003; Olson 1999, 106).

The federal government took other action based on the findings of the National Agricultural Lands Study. The Farmland Protection Act of 1981 required that the Soil Conservation Service create a system to identify and prioritize agricultural land based on its productivity, soil quality, and potential for development. The Soil Conservation Service created the Land Evaluation and Site Assessment (LESA) system, which is used by every type of farmland preservation organization (Stokes, Watson, and Mastran 1997, 156).

For farmers, federal farm subsidies are part of normal operations. Since the 1930s, subsidies have supported commodity prices, keeping marginal land in farms. In other instances, farmers receive federal payments to keep viable farmland out of production. The Federal Agricultural Improvement and Reform Act of 1996 (FAIRA), one in a series of farm bills, fixed commodity subsidies and scheduled declining payments until phase-out in 2002 (Olson 1999, 109). However, the 2002 farm bill reinstituted price supports (United States Department of Agriculture 2002, 2002 Farm Bill). Regardless of subsidies, such programs will only postpone farmland conversion in active suburban land markets.

Several federal programs have funded agricultural conservation easements. Section 388 of the 1996 FAIRA established the Farmland Protection Program, which authorized the Secretary of Agriculture to secure agricultural easements on up to 340,000 acres of land in partnership with state preservation programs. The Secretary of Agriculture delegated authority to the Natural Resources Conservation Service (NRCS),

which disbursed funds from the initial $35 million (Olson 1999, 108). The 2002 farm bill earmarked an additional $50 million for the Farmland Protection Program in 2002, and ultimately, up to $1 billion (American Farmland Trust 2004). Many state programs took advantage of the federal funds, which were available as 50/50 matching grants.

The 1985 Farm Bill allowed farmers with specific types of loans from the Farm Services Agency to lower their payments by accepting 50-year conservation easements. The Farm Services Agency may also place agricultural easements on land on which it has foreclosed. Neither the Farm Services Agency nor farmers have used agricultural easement options. The 1990 Farms for the Future Act allowed the federal government to guarantee loans made to state trusts by private lenders to purchase threatened farmland and development rights. Only Vermont used this program, which today is inactive (Olson 1999, 107).

Use of Conservation Easements

Conservation easements take advantage of the notion that property rights operate like bundles of sticks. By selling the conservation easement, a landowner isolates the "stick" that represents the right to develop the land and sells it to a government or private organization. Easements were first used to secure routes for roads, canals, rail lines, and utility lines that cross private properties.

In the 1930s, the National Park Service wanted to protect scenic views along the Blue Ridge Parkway and the Natchez Trace Parkway (Buckland 1987, 243). The Park Service used scenic easements as a way to reduce costs. The fee simple purchase of land in the amounts needed was too expensive. Given the newness of the concept, many

misunderstandings and violations resulted, and the Park Service discontinued the use of scenic easements in the 1950s. Learning from the National Park Service's mistakes, states and conservation groups began to procure easements along scenic highways. In the 1960s, scenic easements gained legal validity in several states and the National Park Service began to use easements again (Buckland 1987, 245).

Many planners and scholars linked the emerging popularity of conservation easements to increasing disorganized suburbanization that blurred the boundaries of American cities in the years following World War II (Buckland 1987, 244; Olson and Olson 1999, 25). William H. Whyte, long a critic of corporate America and suburban lifestyles, coined the term "conservation easement" in the 1960s (Buckland 1987, 244).[1] Whyte, famous for *The Organization Man,* his 1956 critique of corporate culture, drew much attention to the use of conservation easements to channel urbanization. However, governments and private groups generally used easements to preserve scenic forested landscapes adjacent to parkways, historic parks, and wild and scenic rivers (Buckland 1987, 245).

Conservation Easements as Tools for Farmland Preservation

In the 1970s, conservation easements began to be used for farmland preservation. Suffolk County, New York, which occupies the eastern two-thirds of Long Island, pioneered a farmland protection program using conservation easements. The technique came to be popularly known as "purchase of development rights" or "purchase of agricultural conservation easements." Suffolk County's program received much attention

[1] Whyte also popularized the term "suburban sprawl."

because it was the first. However, given the county's proximity to New York City and the attendant increase in land values, its experience is unique. Suffolk County offered an average of $6,000 per acre for easements in the mid-1970s, a figure that was rarely matched in Pennsylvania thirty years later (Lyson, Geisler, and Slough 1999, 209). Suffolk County relied solely upon conservation easements to preserve farmland, eschewing other methods, including preferential tax assessment and agricultural districts. The county quickly preserved over 4,000 acres of farmland.

Maryland and Massachusetts, two states facing significant urban expansion in the 1970s, were groundbreakers in establishing conservation easement programs at the state level. Massachusetts' enabling legislation was passed in 1977, and acquisition of development rights commenced in 1980. In three years, 10,000 acres on one hundred farms had been preserved (Buckland 1987, 248). State legislation in Maryland enabled the purchase of conservation easements in 1974, and within a decade the state had preserved nearly 15,000 acres. Maryland requires that preserved parcels be located within a state-designated agricultural district. Maryland remains a national leader in progressive growth planning and farmland preservation, ranking a close second behind Pennsylvania in conservation easement acreage (American Farmland Trust Farmland Information Center 2005, 2).

Maryland and Massachusetts were the first states to grapple with a question that troubles farm preservation programs. How can regulations be structured to ensure that land most in need of preservation gets priority in light of limited public funding? Usually, programs try to strike a balance between fragmented parcels of land that are in imminent danger of urban development and large blocks of farms that have a good

chance of remaining in production. Early preservation programs required that parcels meet specific criteria related to development potential, agricultural productivity, land use, and parcel size (Buckland 1987, 248). States continue to struggle with efficient expenditure of the public's resources and the requirements for a successful conservation easement program. Conservation easement programs have become more connected to state and county planning agencies, reflecting a move toward increased regional coordination of urban growth.

Until 1979, conservation easement programs were in northeastern states. King County, Washington, became the first entity on the west coast to enact a conservation easement program. The program's evolution was slow, but it succeeded in preserving 2,250 acres by 1984. King County was the first in the nation to create priority ranking to classify land according to development and agricultural potential (Buckland 1987, 248).

Preservation Critiques: A Private Amenity at Public Expense?

The push for farmland preservation has created real and perceived problems in several spheres. Farmland has taken on more than its historical role for agricultural production. Farmland is an amenity, one that in places is quite high in demand. With farmland's added role as an amenity, housing markets respond to proximity to farmland quite differently than in the past. In a vein similar to land adjacent to national and state parks, preserved farmland attracts new up-scale housing. Many home buyers wish to have the guarantee that the picturesque land near their property will never become rows of cookie-cutter houses replete with noisy neighbors. For this reason, some preservation efforts may stymie the attempt to preserve large blocks of farmland. On the other hand,

farmers also are attracted to land adjacent to preserved farms. Such land is less likely to be encroached upon by urban uses. Whether farmers or developers purchase the land, its value is driven up. Rising values make further easement purchases more difficult. These issues underline the importance of preservation programs operating in tandem with municipal growth management plans.

A concern over the loss of affordable housing is one of the strongest criticisms against farmland preservation. Preservation shrinks the amount of land available for new residences and can lead to rising house prices. Studies indicate that farmland preservation can unintentionally price low-income households out of the housing market. A tight housing market is raising concerns in Lancaster County, Pennsylvania, one of the top preservers of farmland in the nation (Mundy, July 10, 2003). These concerns coalesce into an important question: do farmland preservation programs provide an amenity to an affluent few at the public's expense? Proponents of this view believe it is unfair that tax dollars of the inner city residents and other citizens who do not live near farms subsidize the program. In opposition, preservationists argue that farmland lowers municipal expenditures on services and helps to stabilize tax assessment rates. Preservationists also point out improvements to the local environment and economy that farmland can engender. These benefits, they argue, apply to all residents of an urban area, whether or not farms can be seen from every dwelling (Hellerstein et al. 2002, 8).

According to opinion surveys, the majority of Americans are willing to contribute part of their taxes to preserve privately owned land because it adds to their quality of life (Hellerstein et al. 2002, 16; Tringali et al. 2001, 4). The surveys indicate a shift in the ways Americans value land, including a shift in the relationship between individual

property rights and public benefits. This shift is reflected in federal policy and is rooted in America's transition from a rural to an urban nation. However, the cumulative effects of conservation easement programs on housing markets and the conversion of agricultural land to urban uses have yet to be studied.

CHAPTER THREE

Farmland Preservation in Pennsylvania

As Constance Perin notes in her 1977 book *Everything in Its Place*, social relationships and actions concerning land use are framed by a web of five groups of principles:

> economic, through exchange in markets; political, through mechanisms allocating power; legal, through the distribution and enforcement of rights, obligations, and sanctions; ideological, through the conflict and consensus of diverse interests; governmental, in the distribution of authority and taxing powers (4).

This chapter analyzes how these five principles have shaped social action in publicly funded farmland preservation in Pennsylvania. Unique physical circumstances and distinctive cultural landscapes have influenced the location and nature of preservation of the state's farmland. In this chapter, I also trace historical changes in land use and the attendant rise and focus of various land preservation movements, including the state's conservation easement program.

Pennsylvania Geography

Pennsylvania, with its long east-west axis, contains a cross-section of the landform regions that run north-south across the eastern United States (Figure 3.1). The state has a sliver of the Atlantic Coastal Plain and a slender coastal plain along Lake Erie. The urban core of Philadelphia is on the Atlantic Coastal Plain and the city of Erie is on the plain along Lake Erie. The moderating effect of Lake Erie encourages the production of orchard fruits along the plain. The lake plain has long provided valuable east-west

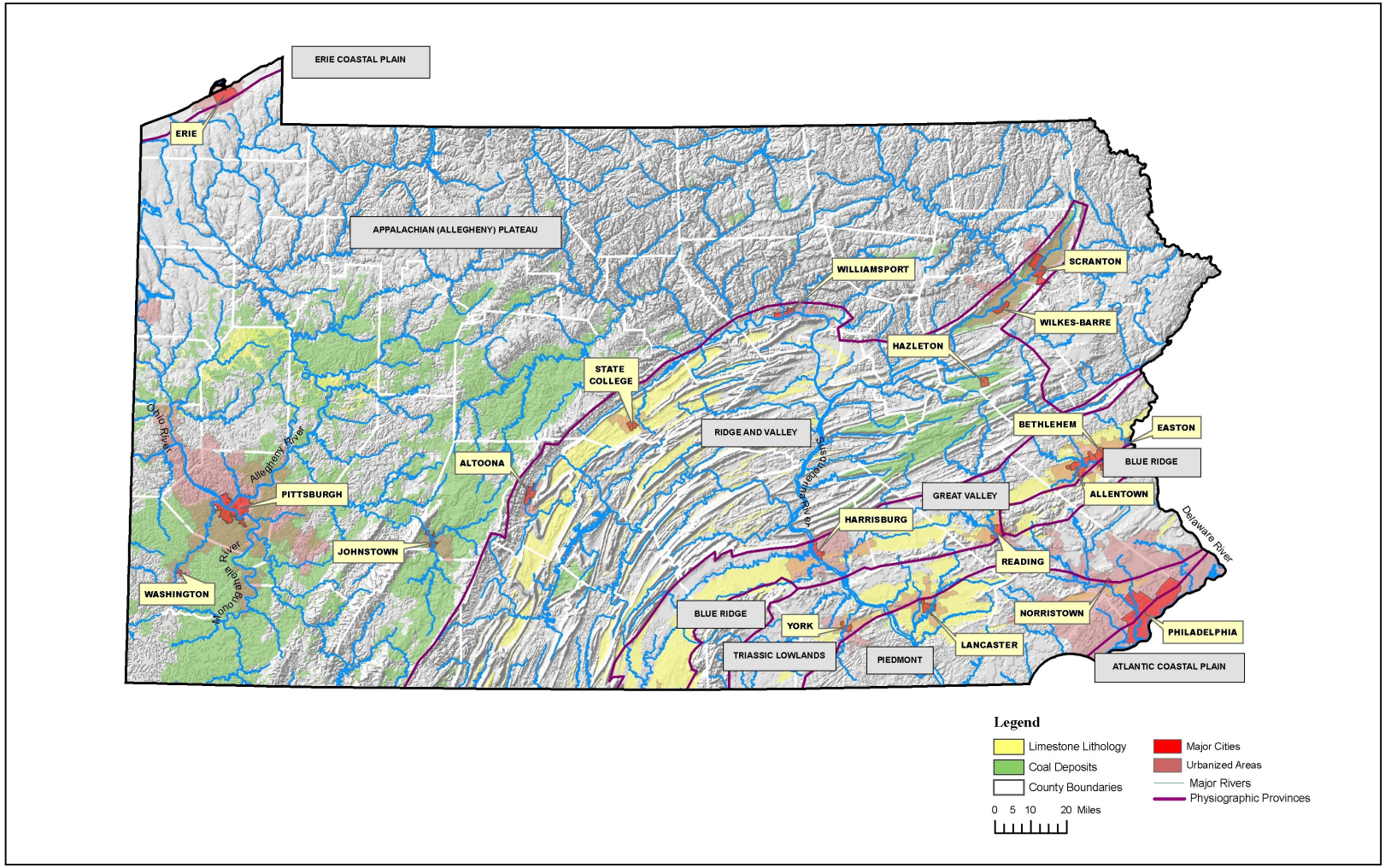


Figure 3.1. Pennsylvania. Source: GIS data from Pennsylvania Department of Transportation, Pennsylvania Department of Conservation and Natural Resources, and physiographic boundaries from Marsh and Lewis, 1995.

transportation routes for railroads and motor vehicles. Inland from the Atlantic Coastal Plain lies the Piedmont. The Piedmont has a low rolling surface that rarely rises more than 500 hundred feet above sea level. The Conestoga Lowlands are a part of the Piedmont underlain by metamorphic limestone, a base that creates productive soils. Throughout Pennsylvania's history, farmers have been able to prosper on the Piedmont (Marsh and Lewis 1995, 19). The Triassic Lowland lies just inland from the Piedmont. The Triassic Lowland contains sedimentary rocks into which volcanic rocks intruded. The volcanic rocks stand as low ridges; the sedimentary rocks formed productive soils in valleys. While the Piedmont and Triassic Lowland are geologically distinct, the cultural landscapes of the two regions are quite similar (Van Diver 1990, 15).

An extension of the Blue Ridge protrudes into Pennsylvania at its border with Maryland. At its northern end, the Blue Ridge is a low, narrow ridge locally known as South Mountain. A second stub of the Blue Ridge, also known as South Mountain, protrudes into the state at its border with New Jersey. The large gap between the two ridges was crucial in directing early settlers westward. North and west of the Blue Ridge is the Ridge and Valley section of the Appalachian Highlands. Long, parallel ridges typically rise 1,000 feet above narrow valleys (Van Diver 1990, 14). During the settlement of the state, the ridges inhibited east-west travel. In many areas, the ridges still frustrate travelers. The valleys often house isolated, but prosperous, communities of farmers, especially where limestone bedrock is present. In the Wyoming Valley of northeastern Pennsylvania, extreme geologic pressure transformed sedimentary deposits of bituminous coal into one of the world's largest seams of anthracite coal. Anthracite, which burns much more cleanly than bituminous, was in high demand when coal-fired

home stoves and furnaces were popular. Although most mines are now abandoned, the extraction of the anthracite deposits in the Wyoming Valley and areas south shaped Scranton and Wilkes-Barre as population centers and left many valleys environmentally devastated (Marsh and Lewis 1995, 31). The Great Valley lies along eastern edge of the Ridge and Valley region. The Great Valley, locally known as the Cumberland Valley, is a wide valley with limestone and shale bedrock. The productive soils support dairy farming, but the Interstate 81 corridor is becoming increasingly urbanized.

West and north of the Ridge and Valley, the landscape changes abruptly at the Allegheny Front, a 1,500 foot-high escarpment that marks the beginning of the Allegheny Plateau (Van Diver 1990, 12). The Allegheny Plateau is underlain by layers of sedimentary rock, including large seams of bituminous coal. Coal provided the energy that fueled Pittsburgh's emergence as an industrial giant in the mid- to late 1800s. Oil and natural gas also occur in this region. Pierce Lewis notes that rivers have dissected the plateau into "a chaos of valleys and knobby hills, the kind of country that encourages neither agriculture or road-building" (1995, 20). The majority of the population on the plateau is clustered within 100 miles of Pittsburgh. Other settlements in the region are small, isolated towns found on land along streams.

The bulk of Pennsylvania's population lives on the Atlantic Coastal Plain and the Piedmont. In 1961, Jean Gottmann published *Megalopolis*, his famous work on urban development along the northeastern seaboard of the United States. Philadelphia, along with Washington, Baltimore, New York City, and Boston, is a central node in this national metropolis (Gottmann 1961, 7). Gottmann included Lancaster, Reading, York, Harrisburg, Allentown, Bethlehem, Scranton, and Wilkes-Barre in Megalopolis (1961,

26) (Figure 3.2). The economies of these cites are closely tied to Philadelphia and New York City. Gottmann noted that land on Pennsylvania's western fringe of Megalopolis remained cheap, allowing dairy farms to thrive (1961, 271). More recently, observers have studied the expansion of Megalopolis into the Ridge and Valley, finding that some areas in Pennsylvania are more closely connected to Baltimore and Washington, D.C. than to Philadelphia (Greene and Benhart 1992, 30; Snyder 2003).

Pittsburgh is the only large city in the western half of Pennsylvania. In the spirit of Gottman's work on Megalopolis, scholars define a metropolitan area from Pittsburgh to Chicago. Because Pennsylvania is split between two national metropolises, the eastern and western halves of the state have less interaction than one might expect. Other population centers emerged throughout the state for historic reasons. Erie developed early as a transportation center; Williamsport is filled with the aging mansions of lumber barons. Other cities in Pennsylvania grew as coal and steel towns and are declining as these industries founder. Despite urbanization, Pennsylvania has one of the largest rural populations in the United States (Simkins 1995, 97). Simkins found that in 1990, forty-two of Pennsylvania's sixty-seven counties were predominately rural and seven of the counties did not have a population center of more than 2,500 (1995, 97-98). Very little of the rural population lives or works on farms, depending instead on local manufacturing establishments or long commutes to metropolitan areas.

The 2000 United States Census defines two types of core-based areas, metropolitan and micropolitan. A metropolitan area consists of an urbanized area of at least 50,000 people and surrounding counties where twenty-five percent or more of the

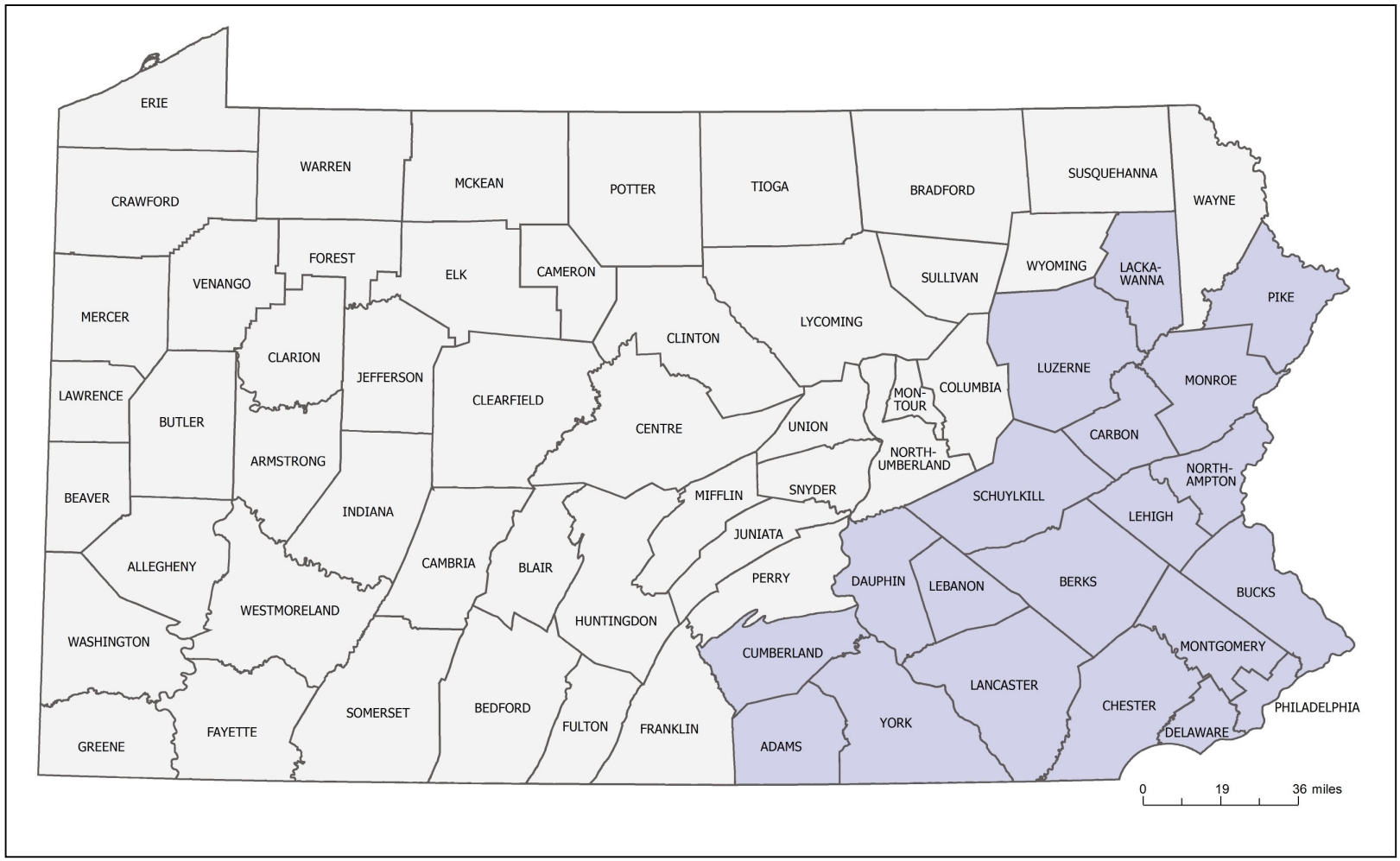


Figure 3.2. Counties Defined by Jean Gottmann as Parts of Megalopolis in 1961. Source: Gottmann, 1961.

workforce commutes into the central county for employment. Micropolitan areas were first defined for the 2000 Census. For micropolitan areas, the urban cluster must have at least 10,000 people. Combined statistical areas are groups of metropolitan and micropolitan areas with employment interchange of at least fifteen percent (U.S. Office of Management and Budget 2000, 10). These groupings cannot be used to distinguish urban areas from rural ones. Instead, they show where population is concentrated and how areas interact in employment (Figure 3.3).

Pennsylvanian Agricultural Landscapes and their Decline

While European settlement in the British colonies of Massachusetts and Virginia began early in the sixteenth century, the first settlers in what became Pennsylvania established their homes in valley of the Delaware River in about 1640 (Simkins 1995, 87). Immigrants from England, Scotland, Ireland, and Wales quickly outnumbered the original Swedish pioneers, and Philadelphia emerged as the leading town of the colony soon after King George III ceded the land to William Penn in 1680. Penn spent many years traveling through Europe, hawking the blessings of Pennsylvania in hopes of luring productive families to his financially precarious colony (Klepp 2002, 69). William Penn and his heirs held Pennsylvania as a feudal estate with the right to appoint governors and to collect taxes in the form of quit-rents (Klepp 2002, 65). In the 1700s, the Penn family, and later the Pennsylvania Assembly, was party to twelve land purchases and treaties with the native occupants (Dykstra 1989, 82). By 1792, the territory within Pennsylvania's current boundaries was consolidated under European control

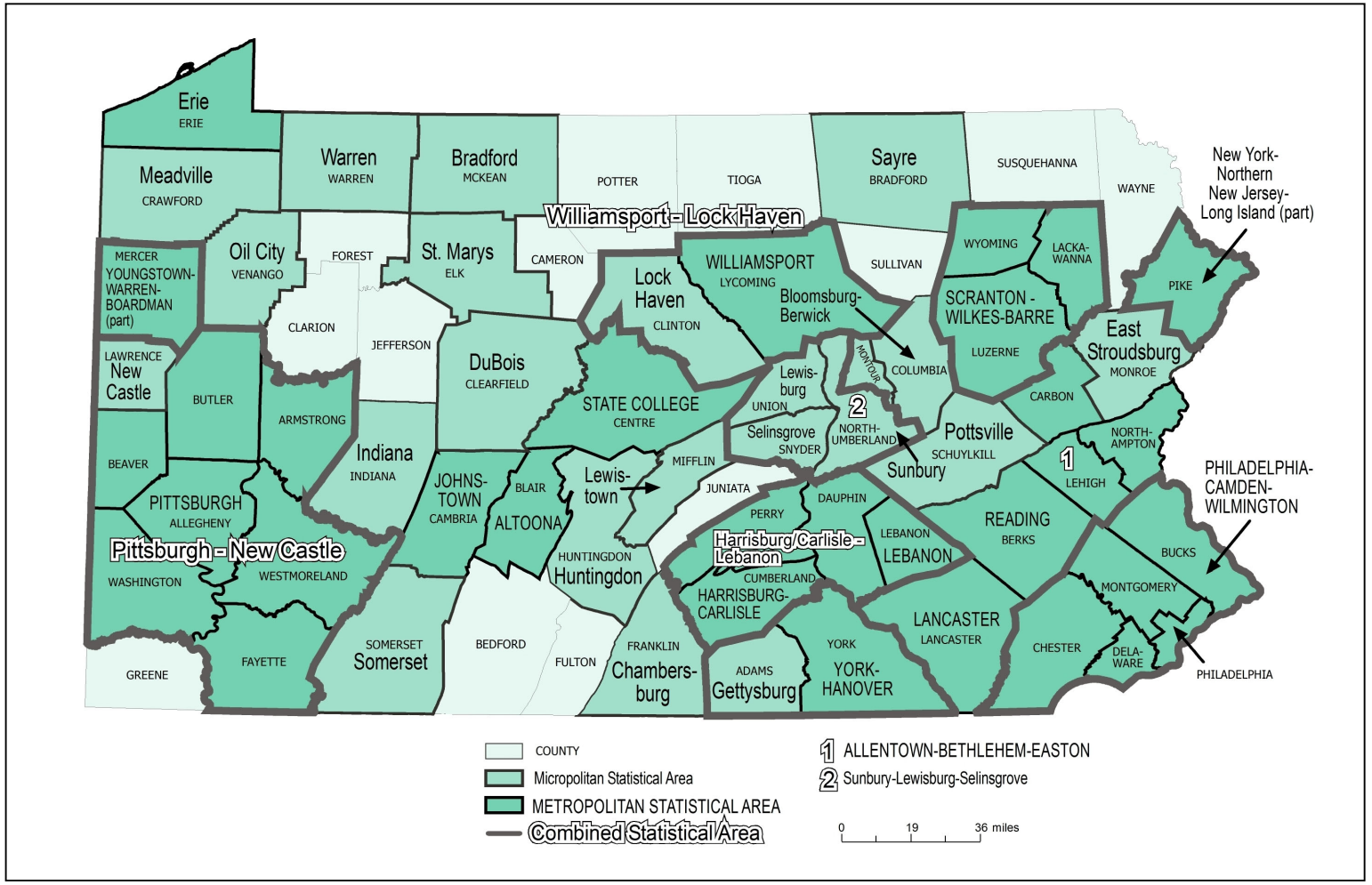


Figure 3.3. Pennsylvania Census-Defined Statistical Areas. Source: United States Census Bureau, 2000.

By 1820, Europeans had settled across the state (Figure 3.4). New immigrants had several ways to acquire land. Until the proprietaryship of the Penn family ended in 1776, individuals purchased land from the family's land office. By 1776, the Penns had sold 6,363,072 acres (Moseby 2000, 3). The purchase agreements generally provided for an initial purchase price and the collection of a yearly payment for every acre warranted. With independence from England, the Penn family's land office became a Commonwealth agency and continued to sell land. A popular but risky method of land acquisition circumvented the land office. Thousands of squatters located vacant tracts of land, settled them, and made improvements with no official sanction. Squatters typically chose frontier areas, pushing the bounds of European occupation. In the 1780s, the General Assembly established Donation and Depreciation Lands in the northwestern part of the state. Because continental currency suffered from severe depreciation, these lands were intended as payment in lieu of cash to Revolutionary War participants. At the same time, the General Assembly lowered land prices and designated numerous parcels for civic and education facilities. These actions were designed to help the General Assembly divest itself of millions of acres of unsettled land in the western and northern portions of the Commonwealth. Few settlers were interested in the land, and most was purchased in large amounts by speculators (Dykstra 1989, 82-83).

In the decades following 1720, thousands of persons from the Palatine region of Germany arrived in Philadelphia and settled on the agriculturally productive lands of the northern Piedmont. The Germans were cinders in a culture hearth that developed in the

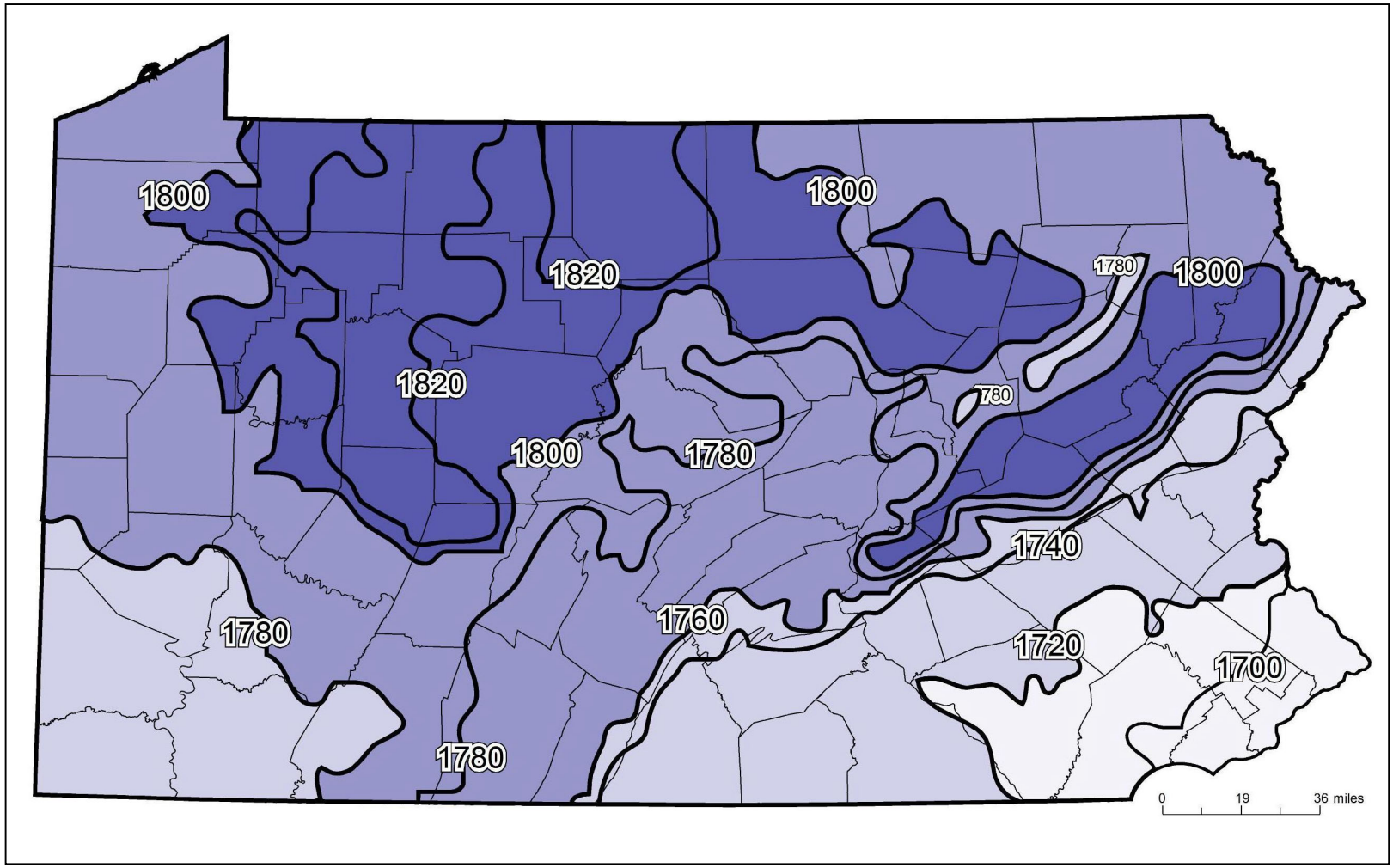


Figure 3.4. Approximate Dates of Settlement. Source: Simkins, 1995.

southeastern corner of Pennsylvania, lodged between the English Quakers of Philadelphia and the Scotch-Irish west of the Appalachian front. As more immigrants arrived, settlers traveled increasing distances from Philadelphia to find vacant land. Upon reaching the Cumberland Valley, many followed its natural sweep southwest into the backcountry of Virginia, Kentucky, and Tennessee (Figure 3.5) (Zelinsky 1995, 137).

As Susan E. Klepp attests, "By the late colonial period, Pennsylvania was the breadbasket of the British Empire. The colony shipped flour and ship biscuit to Europe, Africa, and the Caribbean. Flour mills dotted the countryside" (2002, 90). Klepp notes that the average late colonial family farm was 125 acres and had cattle, horses, pigs, sheep, chickens, and bees. About fifty acres were cultivated, twenty were pasture, three were devoted to housing and outbuildings, and the rest was a woodlot (Klepp 2002, 88). Rather than subsistence farms, early Pennsylvania farms grew surpluses that served a global market (Miller 1995, 184).

The Pennsylvania culture area, as defined by Wilbur Zelinsky, is known for the distinctive barns on its neat farmsteads (Figure 3.6). But the culture area is also marked by compact towns (Zelinsky 1995, 143-144). The main streets of many towns in southeastern Pennsylvania, even today, remain densely built. Both front and side yards are forgone in favor of houses abutting each other and the sidewalk. While larger cities adopted the grid street system of Philadelphia, many small towns have one elongated main street crossed by alleyways, a pattern that is unique to the Pennsylvania culture area (Zelinsky 1995, 144).

The early landscape of southeastern Pennsylvania was marked by compact cities and numerous densely settled small towns interspersed among family farms and small

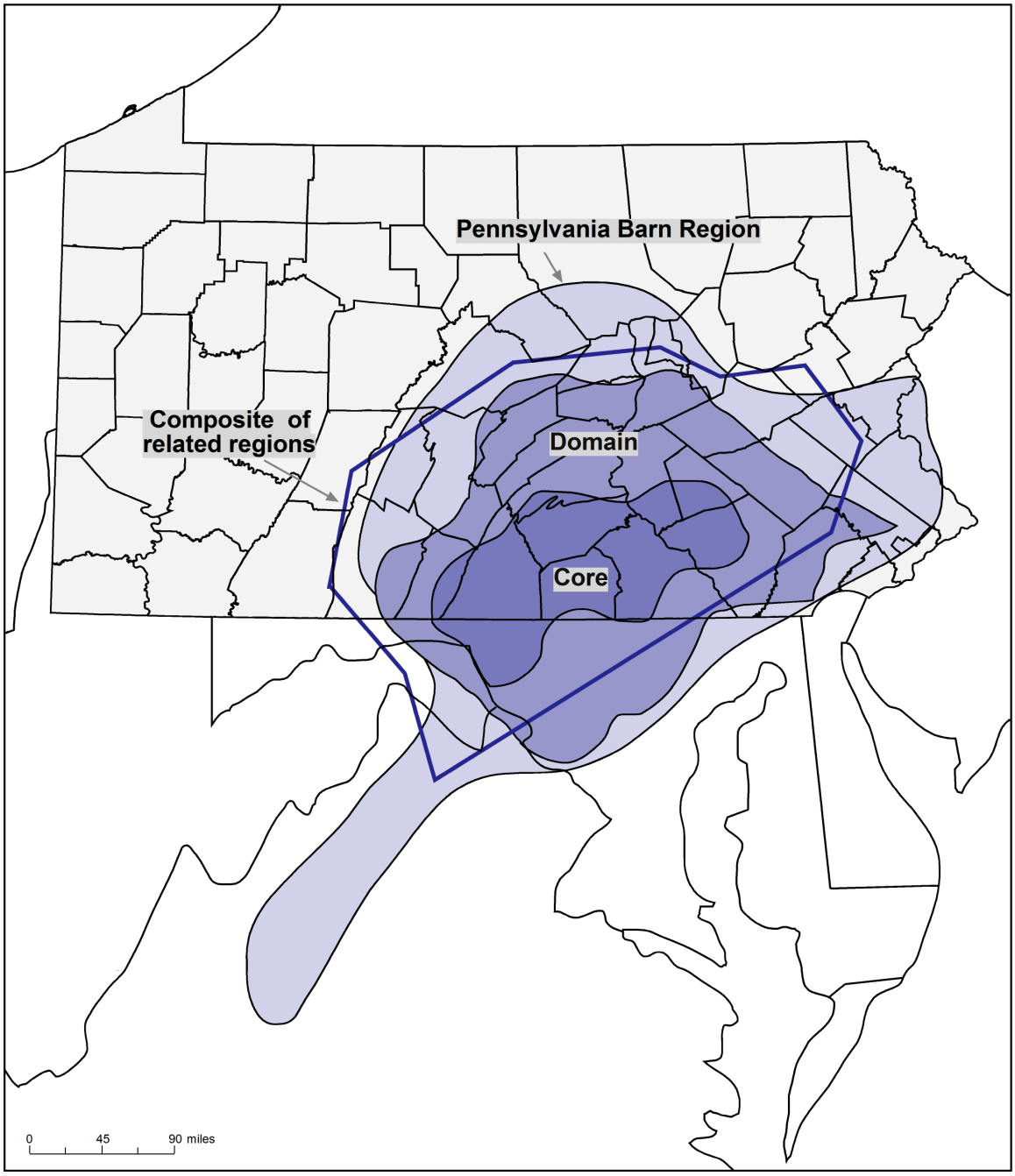


Figure 3.5. Pennsylvania Culture Area. Source: Zelinsky, 1995.



Figure 3.6. Pennsylvania Barn. This barn shows a typical overhanging forebay and banked entrance on the reverse side. Source: Author, 2003.

tracts of woodland. As the Commonwealth's population increased, landowners cleared marginal lands in the northern, western, and central parts of the state. The Ridge and Valley region offered limited amounts of fertile bottomland in dispersed valleys, but much of the rest of the state was poorly suited to agriculture and too thinly settled to reach prosperity based on a farm economy (Zelinsky 2002, 393).

As United States' manufacturing grew from the rumblings of the Industrial Revolution in the early 1800s, Pennsylvania emerged as one the most heavily industrialized states. Farmers on marginal lands readily left agricultural life for jobs in grim growing cities. Farm acreage also declined as gains in agricultural technology allowed larger amounts of food to be produced with less labor (Figure 3.7). Farm acreage in Pennsylvania peaked in 1880 when seventy percent, over nineteen million acres, of the Commonwealth's land area was in farms. The land in farms plummeted rapidly. Land in farms declined from nearly twenty million acres in 1880 to less than eight million acres in 1990 (Miller 1995, 186). Much of the decline can be accounted for by the reversion of unproductive, erosion-prone acreage to forestland, land that in retrospect should never have been cleared.

Agriculture in Pennsylvania today is focused on a group of counties in the southeastern area of the state. Eleven counties have more than forty percent of their land devoted to agriculture. Nine are in southeastern Pennsylvania, and the remaining two are in the Ridge and Valley Province (Census of Agriculture 1997). Lancaster, Chester, Berks, Franklin, Lebanon, Adams, and York counties produce fifty percent of the state's total value of agricultural commodities. Lancaster County alone produces nearly twenty

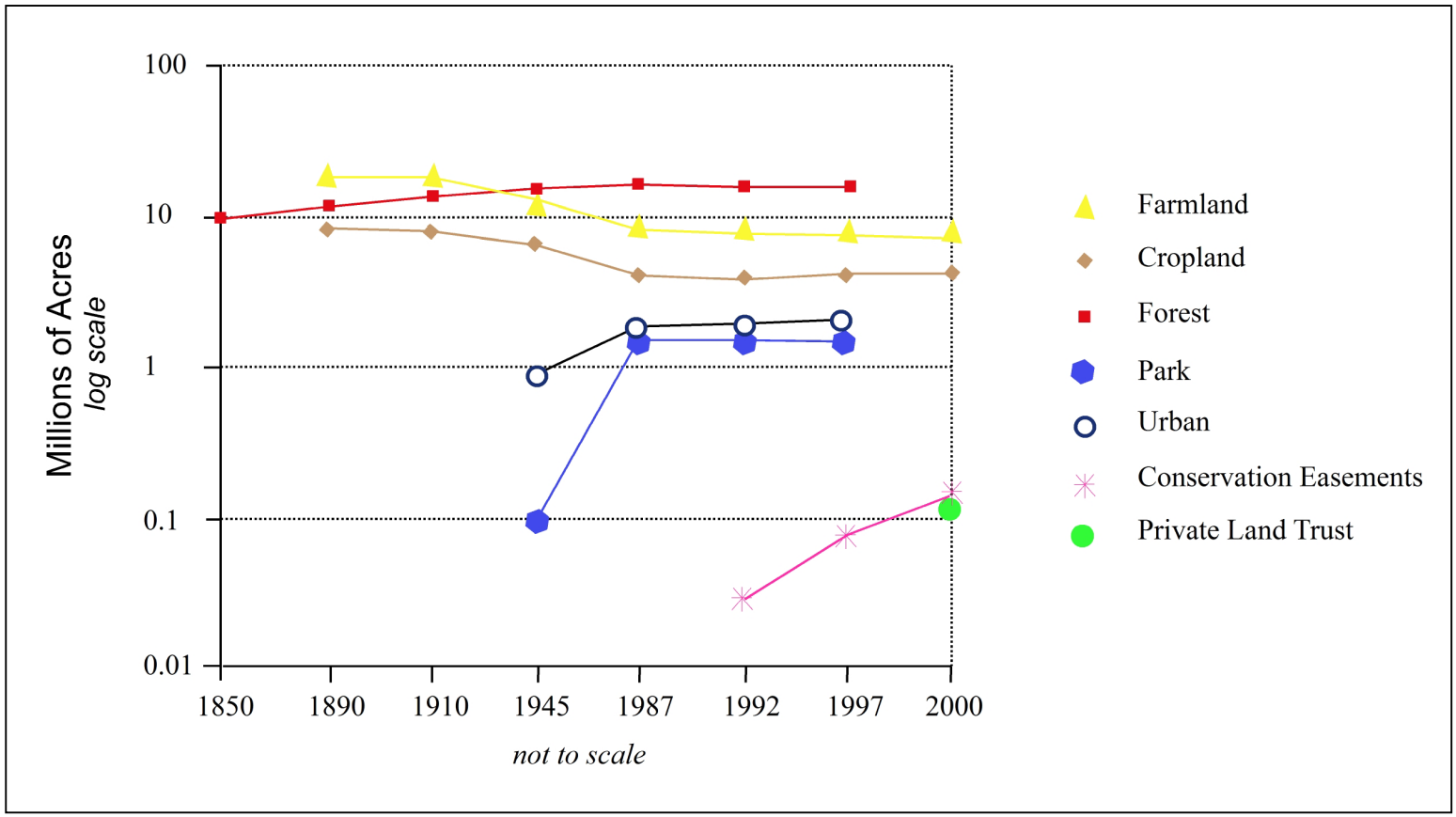


Figure 3.7. Trends in Pennsylvania Land Use, 1850 to 2000. Source: United States Department of Agriuclture, Economic Research Service, 2002 Pennsylvania Case Study.

percent of the state total (Census of Agriculture 1997).

Dairy farming is successful in Pennsylvania because agricultural land lies within easy transport range of major metropolitan areas. In 2000, dairying comprised thirty-seven percent of the state's agricultural receipts (Hellerstein et al. 2002, 32). Dairying dominates the agricultural economy in southeastern Pennsylvania, which produces milk for Washington, D.C., Baltimore, and Philadelphia. Corn production is significant because dairy cattle are fed locally grown grain (Miller 1995, 191). Recently, buying grain from other areas has gained popularity because farmers seek top monetary return from every acre. Tracts formerly planted in corn are now devoted to greenhouses, nurseries, produce, and concentrated poultry and hog feeding operations (Doengus, July 14, 2003).

In the northeastern reaches of the state, Bradford, Tioga, Susquehanna, and Wayne counties are large producers of milk for New York and New Jersey. Scranton and Wilkes-Barre are local markets. In this region, farms are large because the low glaciated hills and floodplains cannot support as many cows per acre as the Piedmont and Triassic Lowlands of southeastern Pennsylvania. Grain is imported from other areas because local production is inhibited by poor soils and limited agricultural land (Miller 1995, 192). Northwestern Pennsylvania is also characterized by low rolling, glaciated topography. Milk from northwestern Pennsylvania supplies Erie and Pittsburgh. The market area does not extend into New York or Ohio because of competition from local producers (Miller 1995, 192). Poultry and livestock do not commonly supplement income. Instead, corn is produced as a cash crop (Miller 1995, 192). In the central and southwestern portions of the state, dairying is concentrated in Bedford, Somerset, Blair,

Huntingdon, and Centre Counties. The milk from this area supplies Pittsburgh (Miller 1995, 193). Merino sheep for wool flourish on the hilly land in the southwestern corner of the state. However, the wool industry is in steep decline because of foreign competition and the popularity of synthetic fibers (Miller 1995, 193).

The agricultural economy of Pennsylvania has been in flux since colonial settlement. Large areas of the state have gone out of production and the types of crops and livestock have changed in response to market conditions. An issue that draws much concern from Pennsylvania residents today is the loss of productive farmland to urban uses. Following a trend in many areas of the United States, Pennsylvania's towns and cities began to expand after World War II (Garreau 1988, 4). The irony is that the state's towns and cities are taking up more and more space despite very low population growth. David Rusk of the Brookings Institution notes, "Over the last fifty years, Pennsylvania ranks second only to West Virginia in consuming the most land for the least population growth" (2003, 2).

Pennsylvania's Fragmented Governmental Structure

Pennsylvania has the third highest number of local governments in the nation. Every acre of land falls within the jurisdiction of a municipal government beneath a county level of government. Article IX, Section 14, of the Pennsylvania Constitution defines "municipality" as "a county, city, borough, incorporated town, township, or any similar general purpose unit of government" (Rusk 2003, 3, 16, 33). Pennsylvania has 2,630 local governments, which amounts to one for every 4,670 residents. The governments include 66 counties, 1,018 cities and boroughs, 1,546 townships, and one

town (Figure 3.8). As a general rule, cities have large populations and land areas while boroughs have small ones. Townships are large rural areas that often lack a concentration of population. Townships hold quasi-municipal status (Rusk 2003, 16). Cities and boroughs may not annex township land. The high level of fragmentation makes cooperation between local governments a challenge. For activities that require a high degree of coordination between local governments in a county, such as farmland preservation or growth planning, fragmentation poses a significant roadblock.

Some studies contend that Pennsylvania's system for governing contributes to sprawl and weakens population centers (Rusk 2003, 2; The Brookings Institution 2003). The built-up areas of most cities and boroughs fill their corporate limits. New growth occurs in the surrounding townships, which cities and boroughs cannot annex. A local government's planning and zoning efforts are contained within a small area. Competition among local governments for economic growth is rife, and regional planning is difficult to foster. The landscape of Pennsylvania, southeastern Pennsylvania in particular, is one of towns and cities with dying cores ensconced in a mishmash of residential subdivisions, commercial strips, abandoned fields, office buildings, and forested fragments (The Brookings Institution 2003, 10, Rusk 2003, 9-10). A growing number of residents are willing to support traditional regulatory devices, including subdivision regulations and zoning ordinances, as well as a new class of creative arrangements, including conservation easements.

Land preservation in Pennsylvania initially centered on its forests. By 1900, industrial demand for timber had denuded much of the Commonwealth's land and left it

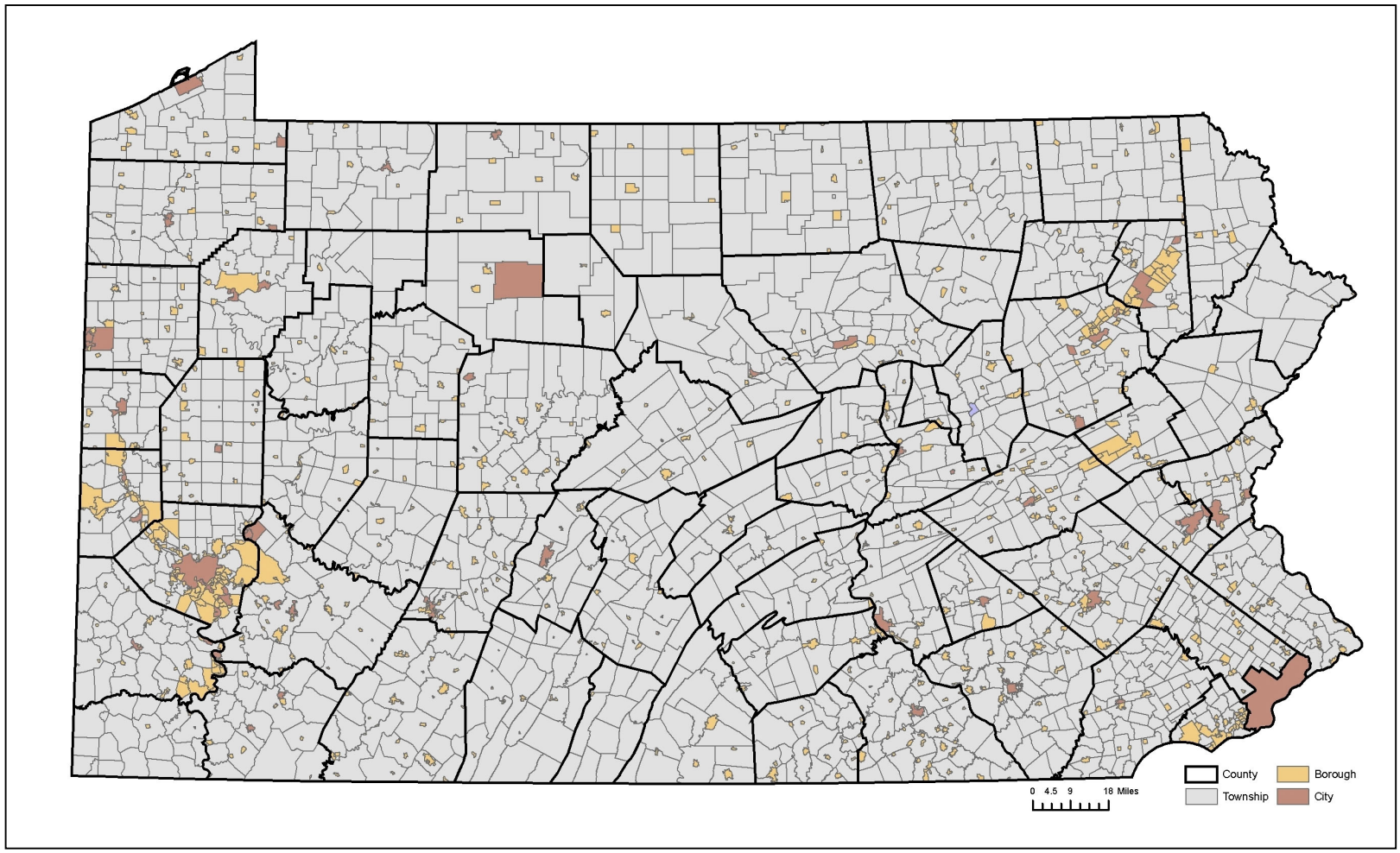


Figure 3.8. Pennsylvania Municipal Divisions by Classification. Source: Pennsylvania Department of Transportation, 2006.

open to erosion. In 1895, Pennsylvania began acquiring acreage that became the heart of the state park system. Early conservation efforts centered on the "preservation and protection of rare, scenic, historic, and natural areas … often to provide health benefits … and motorist camping sites" (United States Department of Agriculture 2002). Farmland was afforded no special protection. It was too common to seem particularly rare, scenic, or historic. Attitudes concerning protection of farmland remained apathetic until the late 1960s, after state park development slowed (Hellerstein et al. 2002, 38).

The Legal Framework of Preserving Farmland in Pennsylvania

In 1968, the Pennsylvania General Assembly recognized that the 1920s-era zoning laws were sorely out of date and redrew much of the Commonwealth's land use legislation. In 1973, voter-approved Joint Resolution No.1 amended the State Constitution to allow for preferential tax assessment according to land use. This move was followed in 1974 by the enactment of the "Clean and Green" program, formally known as the Pennsylvania Farmland and Forest Land Assessment Act of 1974. "Clean and Green" allows parcels ten acres and more that are designated agricultural, agricultural reserve, or forest reserve to be assessed at use-value instead of prevailing market value. If owners take land out of the designated uses, they face a seven year rollback tax penalty (Governor's Center for Local Government Services 2003, 30; Daniels 1998).

While providing tax relief, persons who study farmland preservation generally hold use-value assessment to be weak tool. The rollback penalties are too easily offset by the profits to be made by development (Libby and Steward 1999, 166). Also, the

program does not address other aspects of the impermanence syndrome. Nonetheless, residents of areas where the land market is less competitive have put "Clean and Green" to good use. More than 6,500,000 acres were enrolled in the program in 2000. The majority of the acreage was forestland (Governor's Center for Local Government Services 2003, 30).

In the early 1980s two pieces of legislation that address other aspects of agricultural land loss were passed. Act 43 of 1981, the Agricultural Area Security Law, authorizes landowners to propose the formation of agricultural security areas to municipal and township governments. A security area must consist of at least 250 viable agricultural acres. The acreage may be non-contiguous if all tracts are ten acres or larger (Pennsylvania, 1981, 3 P.S. 901-915). Passed in 1979, Act 100 mandates that the state Agricultural Land Condemnation Approval Board must approve any condemnation or purchase of farmland for public uses such as waste treatment facilities. The Agricultural Area Security Law goes further and requires the Agricultural Land Condemnation Approval Board to approve condemnations of farmland by the state Department of Transportation. Act 43 legally enables a Purchase of Agricultural Conservation Easements (PACE) program, but, at the time, did not appropriate money for administrative costs and easement purchases (Pennsylvania, 1981, 3 P.S. 901-915).

Act 43 was complemented by the passage of right-to-farm legislation in 1982. Right-to-farm legislation, Act 133, protects farmers from nuisance lawsuits brought by persons who buy property near a farm. Farmers are protected from public nuisance suits provided their farms have been in operation for at least one year without attracting any other nuisance suits and that no substantial changes to their farms have been made. All

fifty states have enacted a version of right-to-farm legislation (Daniels 1998). The General Assembly later amended Act 133 to include protection for farmers who are in compliance with the state's Nutrient Management Act, regardless of the nature of their operations or any changes. Recently, Iowa's Supreme Court struck down the state's version of this new level of protection, stating that the law gives landowners no legal recourse in the case of a neighboring farmer who might add a concentrated feeding operation or introduce a similar nuisance (Pennsylvania State University College of Agricultural Sciences 1999). No such challenge has been mounted to Pennsylvania's amended Act 133 although farmers are concerned that one might be initiated.

While the legal authority to establish the Purchase of Agricultural Conservation Easements (PACE) program has been in place since 1981, momentum increased after a 1987 voter referendum approved funding by a $100 million bond issue. In 1988, the Pennsylvania Farmland Preservation Program Act was passed. It mandates the formation of a state Farmland Preservation Board to oversee the administration of the program. The Farmland Preservation Board's responsibilities include certifying and monitoring county preservation boards, buying easements, and allocating funds to certified counties according to a legislated formula (Pennsylvania Land Trust Association October 2, 2005).

Act 26 of 1991 provided additional funding for farmland preservation. In 1992, the Agricultural Area Security Law was amended to make use of funds authorized by the 1990 federal farm bill. Smokers have funded the program since 1993. Two cents of the state's cigarette tax were dedicated to farmland preservation from 1993 to 2002. In 2002, the General Assembly earmarked $20 million of the cigarette tax revenue annually for

farmland preservation. This change addresses the concern that declining numbers of smokers will decrease the money available from cigarette tax revenues (Pennsylvania Department of Agriculture 2003). When the 1996 federal farm bill was passed, Pennsylvania successfully lobbied for $4 million, the largest amount given to a state.

Pennsylvania continues to expand the ways in which the program offers assistance to county and private preservation organizations. Act 75 of 1993 and Act 96 of 1994 made adjustments to the formula used to distribute state funds to counties (Pennsylvania Department of Agriculture 2003). The Agricultural Land Conservation Assistance Act of 1994 makes grants available to counties with certified programs. Counties apply for grants to fund projects that help administer programs more efficiently (Pennsylvania Department of Agriculture 2001).

The Land Trust Reimbursement Grant Program, passed in 1999, makes it possible for state-certified private land trusts to recoup administrative costs of easement purchases through state grants (Pennsylvania Department of Agriculture 2003). That same year, the Long Term Installment Easement Purchase program became a reality. It allows farmers the choice of receiving payment for easements in a lump sum or distributed over a period of up to 30 years. Installment payments are helpful to both farmers and government entities. Farmers can expect an annual payment, and government entities can use limited funds to secure easements on a greater number of properties. In 1999, Governor Thomas Ridge successfully moved the massive Environmental Stewardship and Watershed Protection Act, known as "Growing Greener," through the state legislature. "Growing Greener" budgeted $650 million over five years for environmental programs. The Department of Agriculture received $100 million over four years to address the backlog

of farmers seeking participation in the Purchase of Agricultural Conservation Easement program (Pennsylvania Department of Agriculture 2003).

Much of the legal validity of conservation easements in Pennsylvania rested on common law until 2001, a situation that created an inconsistent mass of court decisions. Pennsylvania common law does not assume that conservation easements are valid. The Conservation and Preservation Easements Act of 2001 establishes statutory validity for conservation easements. Conservation easements purchased before the passage of the Conservation and Preservation Easements Act continue to rest on common law, but easements purchased after its passage are deemed valid (Pennsylvania Land Trust Association October 2, 2005). The act narrows the bases for mounting legal challenges to easements, standardizes the ways in which easements are created, and limits court costs for county, state, and private organizations that must defend easements (Pennsylvania Land Trust Association October 2, 2005).

In 2003, Governor Edward Rendell signed House Bill 66 into law. Proponents of farmland preservation opposed the passage of this bill, which conveyed approximately twenty-three acres in Warren County from state to county ownership and removed an agricultural-use deed restriction. Warren County and Walmart plan to develop the parcel. In answer to preservationist concerns, Governor Rendell stated that the bill would not threaten the solidity of the state's Purchase of Agricultural Conservation Easements program because the easement was transferred to a larger parcel in the county. Given the recency of the legal developments, the full impact of the precedent that House Bill 66 sets has yet to be felt (Pennsylvania Office of the Governor, 2003).

In 1980, Lancaster County formed an agricultural preservation board to administer conservation easement purchases and served as a model for the state program. However, many counties did not purchase conservation easements until the state passed the Purchase of Agricultural Conservation Easement legislation and the created the Farmland Preservation Board in 1989 (Figure 3.9). The American Farmland Trust's recent assessment of state-level agricultural easement programs termed Pennsylvania unique in its minimal review of county recommendations (2004).

County boards are appointed bodies that have considerable leeway in designating the criteria that farms must meet to be eligible for easement purchase. Counties must also create maps that identify prime agricultural land and areas which lie in the path of urban development. The state board requires that counties consider parcels 50 acres or larger. Parcels between 10 and 50 acres may be considered in several instances. Half of the land must be used as pasture or row crops. At least 50 percent of a parcel's soils must be categorized as classes I-IV as defined by the National Resource Conservation Service. Preserved land must also be part of an Agricultural Security Area of at least 500 acres (Pennsylvania Code Title 7, Section 138e.1 et seq.).

Counties must rank applications using Land Evaluation and Site Assessment (LESA), a standardized system for the evaluation of agricultural land. Land Evaluation and Site Assessment has four distinct parts that rate soils, development potential, farmland potential, and clustering potential, or the proximity of other preserved land. Counties may weight each category, within limits set by the state (Table 3.1). Land evaluation is based solely upon the soil productivity of a parcel. The formula, which multiplies the acreage of land in each soil class by a weighted value, is used

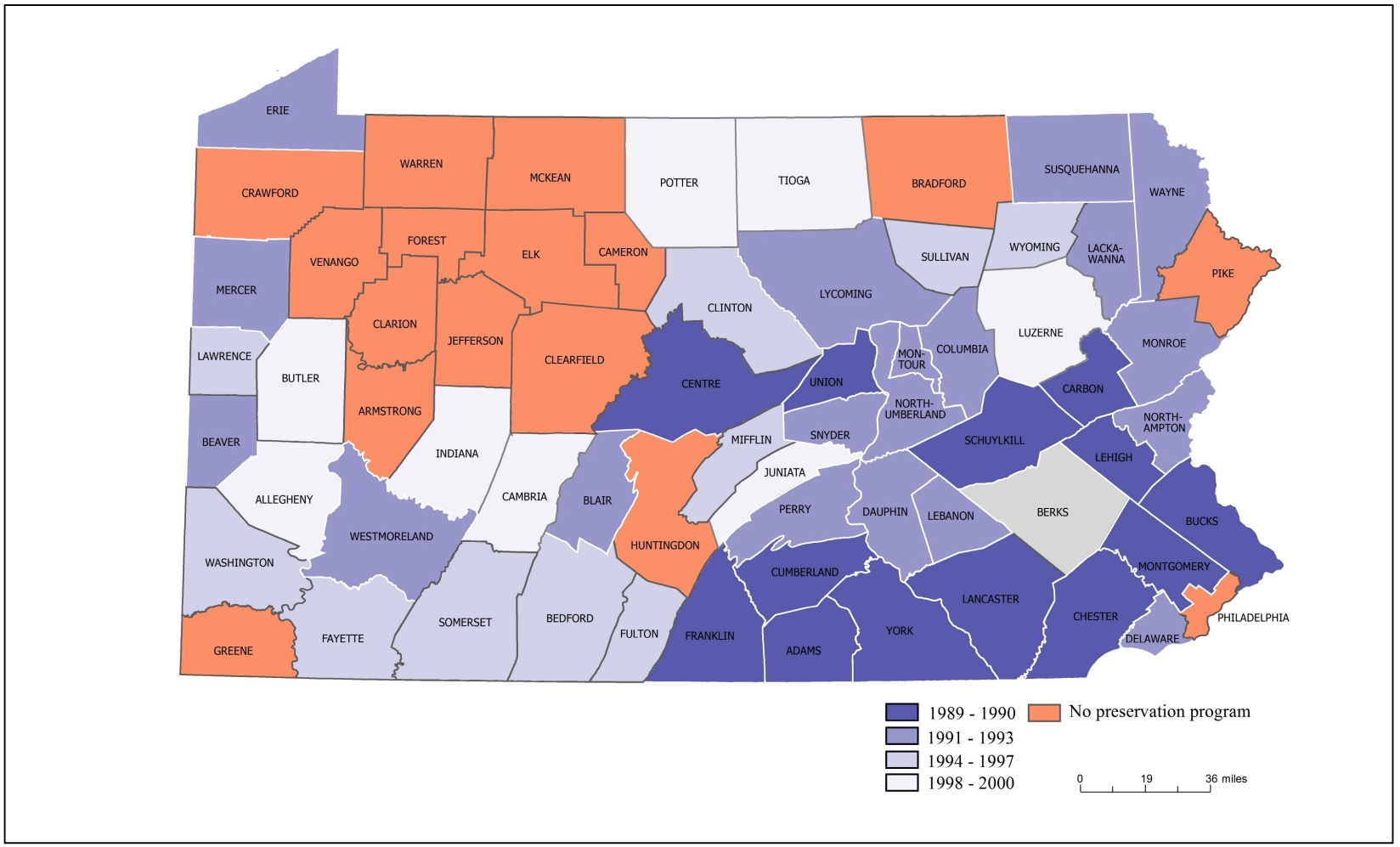


Figure 3.9. Time Period in which County Conservation Easement Purchase Program was First Certified by State Preserve Board. Source: Pennsylvania Department of Agriculture, 2003.

Table 3.1. State Land Evaluation and Site Assessment Category Weights.

Category	Minimum Weight	Maximum Weight
Land Evaluation - Soils	40%	70%
Site Assessment - Development Potential	10%	40%
Site Assessment - Farmland Potential	10%	40%
Site Assessment - Clustering Potential	10%	40%

Source: Pennsylvania Code. Title 7. Part V-C, Section 138e.1 et seq.

throughout Pennsylvania (Pennsylvania Code Title 7, Section 138e.1 et seq.). The site assessment portion of the evaluation consists of the potential for urban development, potential as productive farmland, and the potential for clustering with other preserved land. Counties must rank parcels in the three categories but may choose specific criteria and assign point values as they see fit (Table 3.2). In considering development potential, parcels in proximity to water and sewer lines, with considerable road frontage, and abutting urban uses receive more points.

Farmland potential is judged by the size of a tract, the percent used for pasture and harvested cropland; environmental stewardship; and historic, scenic, or and environmental qualities. A tract with eighty percent of the land farmed receives more points than a tract with only fifty percent in agricultural use. A large tract receives more points than a small one. Environmental stewardship includes implementation of soil erosion and sedimentation prevention plans, best management practices, and nutrient management plans. The state mandates soil and water conservation on at least fifty percent of a tract for it to receive a score. A parcel earns points if it is adjacent to park land, protected habitats like wetlands, or is historically significant. Several counties award points to Century Farms, a state designation given to farms that have remained in one family for 100 or more years (Pennsylvania Department of Agriculture 2005).

Clustering potential is rated by awarding points for proximity to other conservation easements, the percentage of adjoining land that is in an Agricultural Security Area, and how consistent an easement purchase is with county planning goals. Counties may add criteria or make substitutions with state approval (Pennsylvania Code

Table 3.2. State Mandated Criteria for Land Evaluation and Site Assessment.

Category	Criteria
Soils	Acreage in soil classes I-IV
Development Potential	Availability of water and sewer lines
	Extent of road frontage
	Extent of nearby nonagricultural land uses
	Up to seven other county-designated criteria
Farmland Potential	Size of tract
	Percent of harvested cropland, grazing land, or pasture
	Stewardship of land
	Historic, scenic, and environmental qualities
	Up to six other county-designated criteria
Clustering Potential	Proximity to other conservation easements
	Percent of adjoining land in an agricultural security area
	Consistency with planning map
	Up to seven other county-designated criteria

Source: Pennsylvania Code. Title 7. Part V-C, Section 138e.1 et seq.

Title 7, Section 138e.1 et seq.). After ranking applications, a county may offer easement purchases to the owners of the highest-ranking parcels. The state board must review and approve an easement purchase and execute the agreement of sale. The state purchases an easement only in perpetuity. However, a loophole exists. If a parcel is not agriculturally viable twenty-five years after the deed restriction, the easement may be broken pending the return of the purchase price (Pennsylvania Code Title 7, Section 138e.1 et seq.). The state board makes monies available as matching funds and grant funds. The state board determines a spending threshold for the upcoming fiscal year. The threshold should be at least $10,000,000.[2] Each certified county receives an allocation that is equal to half the spending threshold multiplied by a weighted measure of its realty transfer tax revenues. The remainder is allocated in amounts equal to each county's annual easement appropriations.

Pennsylvania's Preservation Landscape

By 2003, Pennsylvania and participating counties had preserved 252,296 acres of farmland in 2,132 easements (Pennsylvania Department of Agriculture 2003).[3] Fifty-three counties had state-certified preservation programs, fifty-one had purchased easements, and sixty-four had established Agricultural Security Areas. Statewide, 879 Agricultural Security Areas provide protection to 3,472,649 acres (Pennsylvania Department of Agriculture 2003). However, the level of county participation is not evenly distributed across the state.

[2] If the Agricultural Conservation Easement Purchase fund is less than $10,000,000, the threshold is the amount in the fund.
[3] These figures do not include lands preserved through private conservancies.

In 2002, the ten counties with the most farm acreage in conservation easements and highest funding levels for easement purchases were in or east of the Great Valley (Pennsylvania Department of Agriculture 2003) (Figures 3.10, 3.11). State funding of county programs follows a similar pattern, with one notable exception (Figure 3.12). Because the state funding formula uses realty transfer tax revenues as a variable, some counties receive state grants even though they may spend little of their own funds on easements. Allegheny County, home of Pittsburgh, receives more state funding than all but seven other counties, despite its small local contribution to easement purchases. The north-central and northwestern portions of the state lack preservation activity. All but two of Pennsylvania's counties without a state-certified preservation board are located in a block in the northwest. This block of counties is a heavily forested rural area where conservation easements are moot because the land is unsuitable for farming. The remaining two counties have low population growth and little farmland to preserve.

Citizens across Pennsylvania support one of the largest farmland preservation programs in the nation (Pennsylvania Department of Agriculture 2003). The carefully crafted legislative framework for farmland preservation is a product of historical circumstance, citizen action, and the regulatory environment of state and county agencies. The Pennsylvania Department of Agriculture lists increased public awareness as a positive outcome of the preservation program (Pennsylvania Department of Agriculture 2003).

The legislative machinery that has evolved may not meet all citizens' goals for farmland preservation. The legislation allocates the most state money to counties that can

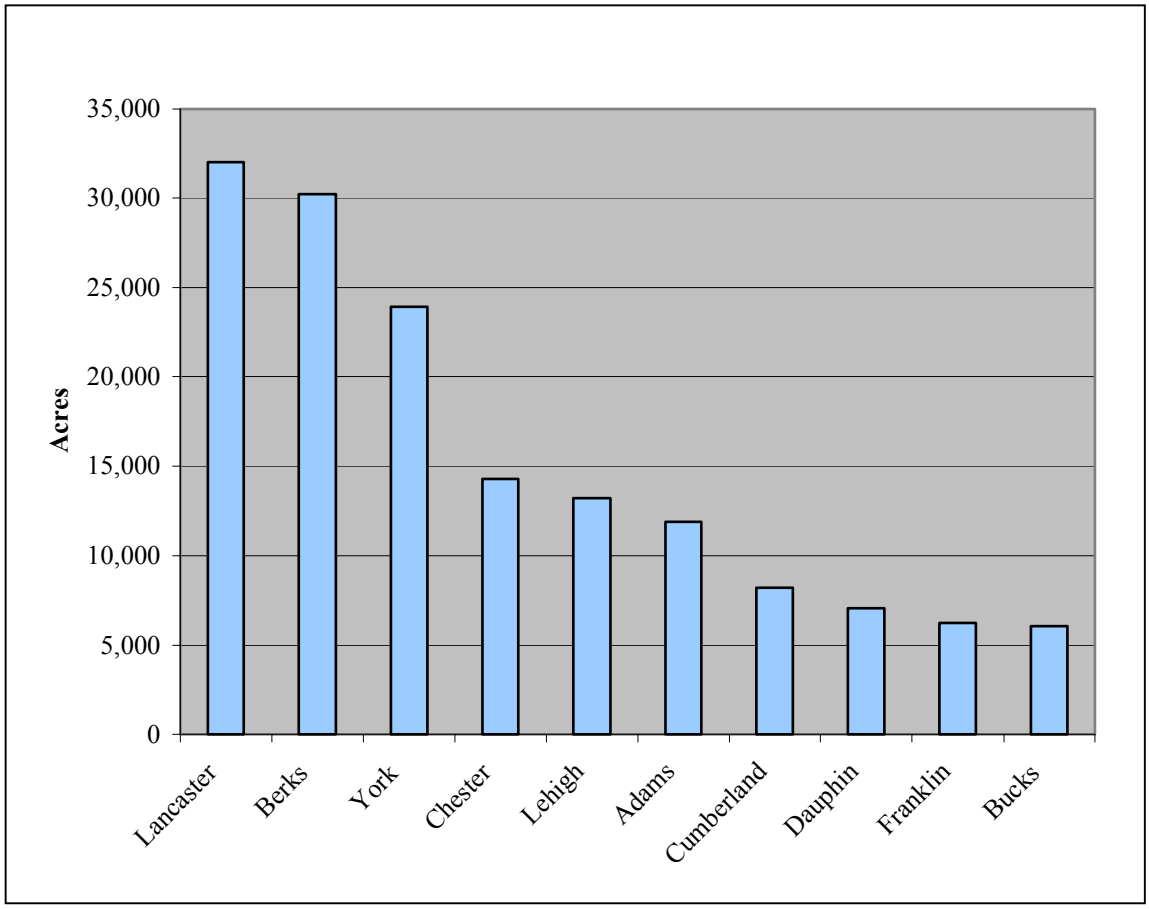


Figure 3.10. Counties with Highest Acreage of Farmland in Conservation Easements in 2003. Source: Pennsylvania Department of Agriculture, 2003.

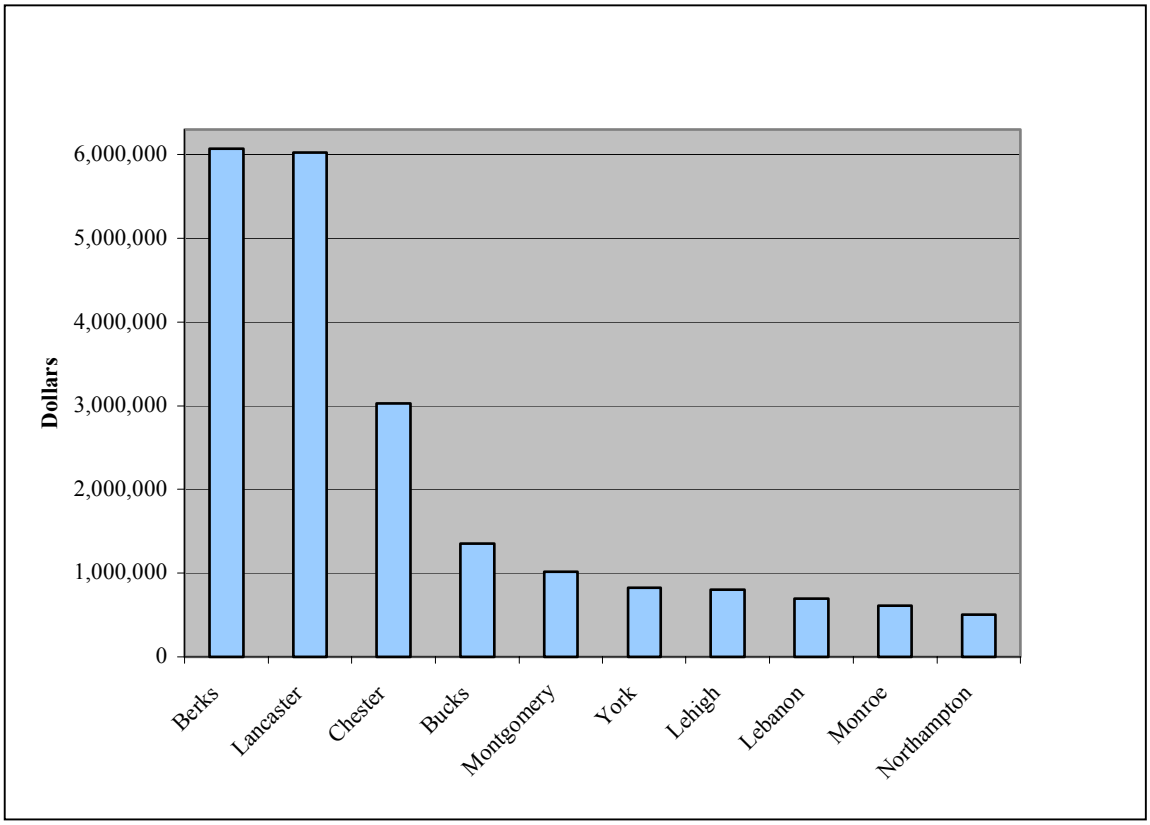


Figure 3.11. Counties with Highest Levels of County Funding for Conservation Easement Purchases in 2003. Source: Pennsylvania Department of Agriculture, 2003.

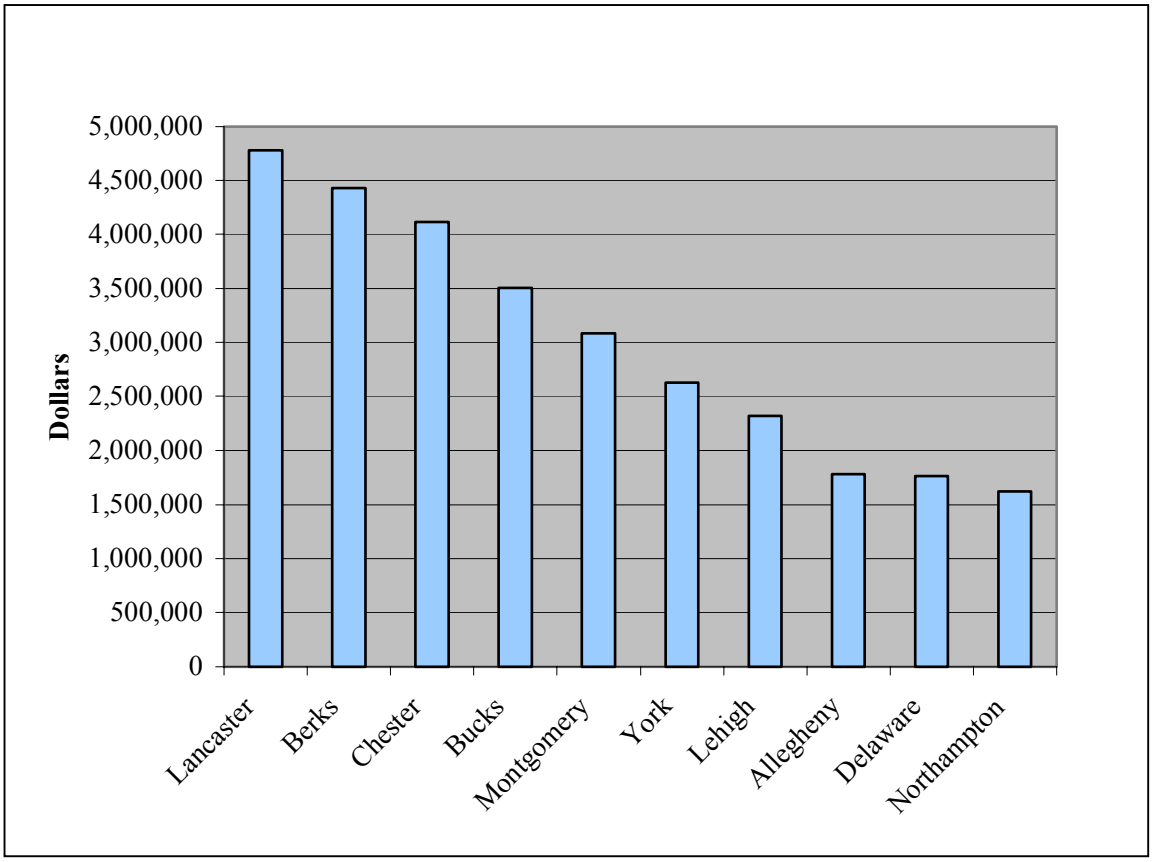


Figure 3.12. Counties Receiving Highest Amounts from Realty Transfer Tax-Based Grants in 2003. Allegheny is the only county located west of the Ridge and Valley Province. Source: Pennsylvania Department of Agriculture, 2003.

raise the most money. Local support engenders state support. Local apathy in the face of urban development also earns state support because the allocation formulas gives funds to counties with high realty transfer tax revenues that put up little or no local money. Despite disparity between local desire for preservation and state support of preservation, the majority of the conservation easements are located in southeastern counties that have raised large local sums. The next chapter analyzes counties with similar levels of program participation to identify common factors for successful conservation easement purchase programs.

CHAPTER FOUR

Pennsylvania's Preservation Activity

In March 2003, Pennsylvania Governor Edward Rendell announced the permanent protection of over a quarter million acres through easement purchases. Easement purchases are not distributed evenly across the state. My hypotheses are that the intensity of urban development and the productivity and viability of agriculture are the most important determinants in predicting the acreage of farmland preserved. As Pfeffer and Lapping note, "A large part of the popularity of purchase of development rights programs in the northeastern United States stems from urban development pressures affecting farmlands in rural/urban fringe areas" (1995, 32). A statistical model using principle components analysis accounts for variation in program participation in Pennsylvania. Comparing component scores to levels of program participation connects the distribution to specific social, economic, and agricultural characteristics.

Development of a Principle Components Analysis Model

Principle components analysis, a mathematical procedure developed primarily in psychology, has applications throughout the social sciences. It is useful in determining order and structure in large multivariate data sets (Tucker and MacCallum 1997, 1; Cody and Smith 1997, 250; Rogerson 2001, 192). In this study, principle components analysis reduces an unwieldy number of independent variables and identifies complex predictors of the dependent variable, the percent of farmland in each county that is preserved by conservation easements.

Principle components analysis begins with the definition of a population and domain (Tucker and MacCallum 1997, 1). In this case, the population is sixty-six of Pennsylvania's sixty-seven counties. Philadelphia, the most populous and densely settled county, cannot participate in the conservation easement program because state regulations exclude counties with population greater than 1,500,000. Philadelphia had fewer than ten farms in 1997 (1997 Census of Agriculture). County data are used because data from the 1997 Agricultural Census, the Pennsylvania Department of Agriculture, and the Center for Rural Pennsylvania are available only at the county level.[4]

The domain for the principle components analysis is the set of variables that affect the acreage of farmland in conservation easements in a county. Within the last decade planners, geographers, and economists have identified a complex set of factors that are characteristic of areas where farmland preservation is popular (Pfeffer and Lapping 1995, 30; Hellerstein et al. 2002, 14-18). The choice of variables in this analysis brings as many into the study as possible. Often, several measures of the same phenomena were collected to allow for the selection of ones with the most predictive power. The dependent variable is the percent of farmland acreage preserved through conservation easements as of 2002.[5] This variable, expressed as a percent, accounts for differences in the number of farm acres per county. The variable emphasizes the progress that counties with few farmland acres have made.

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[4] The Center for Rural Pennsylvania is a state agency charged with promoting and sustaining rural areas. The center maintains an extensive data set by county from a variety of state and federal agencies.

[5] Ideally, the variable measuring counties' monetary commitment to farmland preservation would have been the dependent variable in the model. However, the variable shows a strong curvilinear distribution and cannot be used in a linear regression.

A correlation matrix was run on eighty-four variables (Appendix A). Several variables were eliminated because they mirror other variables. For example, the percent of population that is urban is complementary to the percentage that is rural. Only one measure need remain in the analysis. Established practices in principle components analysis call for the removal of correlations above a certain level, usually those greater than 0.7 or 0.8 (Rogerson 2001, 194). Often related variables are highly correlated by definition. For example, income is typically highly correlated with education. The resolution involves choosing variables that are not highly interrelated. Variables with the highest correlations to the dependent variable are given preference over those with very little relationship. Variables were eliminated until sixteen independent variables remained, of which only one pairing shared a correlation greater than 0.8 (Table 4.1).

The principle components analysis analyzes the sixteen independent variables which represent a wide range of Pennsylvania residents' social and economic conditions. The percent of population that is urban, the percent of the population with a bachelor's degree or higher, and the percent of the work force employed in white collar jobs describes each county's population as rural or urban. The percent of Republican voters is included because conservative political values are traditionally linked to strong support for protection of private property rights. The percent of the population that did not change residence between 1995 and 2000 indicates mobility of households on the urban fringe. The dollars per capita spent on tourism measures disposable income. The percent of the population below poverty level indicates counties where economic hardship may outweigh a desire for farmland preservation. The percent of the workforce

Table 4.1. Correlation Matrix of Variables in Model

Variable	1	2	3	4	5	6	7	8	9
1	1	0.435	0.028	-0.061	0.058	-0.088	0.046	-0.144	-0.208
2		1	0.257	-0.513	0.588	-0.338	0.229	-0.172	-0.059
3			1	-0.699	0.613	-0.593	0.128	-0.052	-0.01
4				1	-0.612	0.78	-0.402	-0.022	-0.031
5					1	-0.512	0.351	0.028	0.231
6						1	-0.287	-0.096	0.035
7							1	0.152	-0.159
8								1	-0.074
9									1
10									
11									
12									
13									
14									
15									
16									

Key to Variables

1	% farmland lost, 1969-1997
2	% land area in farms, 1997
3	average value of agricultural goods sold per acre, 1997
4	% farms selling < $10,000 1997
5	% of state dairy cows
6	% of farmers working off-farm > 200 days in 1997
7	% of Republican voters, 2000
8	per capita travel expenditures, 2000
9	% of workforce employed in county of residence, 2000
10	% of workforce employed in white collar jobs, 1997
11	% of population with bachelor's degree or higher
12	% of population below poverty level
13	% of population that did not change residence, 1995-2000
14	% change in population, 1990-2000
15	% population urban, 2000
16	value of agricultural land and buildings, 1997

Table 4.1., continued.

Variable	10	11	12	13	14	15	16
1	-0.282	0.297	-0.183	0.121	0.041	0.005	-0.029
2	-0.173	0.034	-0.281	0.221	-0.015	0.006	-0.145
3	-0.16	0.381	-0.114	0.355	0.041	0.449	0.803
4	0.128	-0.183	0.093	-0.44	-0.117	-0.171	-0.397
5	-0.171	0.081	-0.163	0.223	0.045	0.077	0.317
6	0.024	-0.106	-0.082	-0.312	-0.157	-0.027	-0.396
7	-0.398	-0.018	-0.328	0.2	0.22	-0.408	-0.205
8	0.1	-0.021	0.067	0.159	0.318	-0.197	-0.031
9	0.093	0.094	0.281	0.143	-0.409	0.361	-0.025
10	1	-0.379	0.659	-0.109	-0.11	-0.149	0.046
11		1	-0.345	0.662	0.24	0.627	0.359
12			1	-0.083	-0.355	-0.24	0.117
13				1	0.44	0.339	0.279
14					1	-0.165	0.05
15						1	0.501
16							1

Key to Variables

1	% farmland lost, 1969-1997
2	% land area in farms, 1997
3	average value of agricultural goods sold per acre, 1997
4	% farms selling < $10,000 1997
5	% of state dairy cows
6	% of farmers working off-farm > 200 days in 1997
7	% of Republican voters, 2000
8	per capita travel expenditures, 2000
9	% of workforce employed in county of residence, 2000
10	% of workforce employed in white collar jobs, 1997
11	% of population with bachelor's degree or higher
12	% of population below poverty level
13	% of population that did not change residence, 1995-2000
14	% change in population, 1990-2000
15	% population urban, 2000
16	value of agricultural land and buildings, 1997

employed within the county of residence measures urban interconnectivity. The percent change in population in each county between 1990 and 2000 is an indication of demand for new housing and population growth that contributes to agricultural land conversion. Inclusion of these variables captures a range of characteristics that may affect political support for a county's purchase of conservation easements.

The remaining variables describe county agriculture. The value of agricultural land and buildings and the average value of agricultural goods sold per acre imply the intensity of agricultural production. The percent of farms selling less than $10,000 annually indicates part-time and hobby farms on the urban fringe (Heimlich and Anderson 2001, 40). The percent of the state's dairy cows gauges the importance of dairying in the economy of counties. Dairy farming also indicates agriculture on the urban fringe (Miller 1995, 190). The percent of farmers working off the farm for more than 200 days annually indicates whether farms can support families without supplemental income. The percent of land area in farms is an indication of the long-term viability of agriculture. The percent of farmland lost between 1969 and 1997 measures the severity of farmland conversion during the decades when Pennsylvania developed programs that address farmland preservation.

The goal of principle components analysis is to analyze observable attributes to identify underlying compound factors or components. Factors may indicate a fundamental condition which is impossible to measure numerically but is identified by several variables that initially may seem unrelated. The variables that load onto a particular component during analysis, along with their strengths, are clues to the nature of the component (Tucker 1997, 2). All factors are indicators of structure within the data set

but are not necessarily significant in explaining variation of the dependent variable (Johnston 1990, 127).

The model identifies five significant factors, or compound variables. Three of the five are significant in regression with the dependent variable, the percentage of farmland with conservation easements, at the .05 level with an r-squared value of .541. Running the regression again on the significant variables results in a slightly smaller adjusted r-squared value of .526. Both of the r-squared values are relatively high and indicate a strong statistical model (Table 4.2). For clarity's sake, researchers who use principle components analysis coin names to describe factors. I have labeled the five factors "Farms on the Cutting Edge," "Big Bountiful Farms," "Pennsylvania State University Syndrome," "Mountain Retreats," and "Farm Loss" (Table 4.3).

The first component is the one upon which the most variables load, or share common variance (Tucker 1997). "Farms on the Cutting Edge" shows high loadings with percent of the population urban, percent of the population with bachelor's degree or higher, value of agricultural land and buildings, and percent of the workforce employed in white collar jobs. There is a strong positive relationship with the average value of agricultural goods sold per acre, a strong negative relationship to the percent of population below poverty level, and a strong relationship to the percent of population that did not change residence between 1995 and 2000. The loadings indicate a component that consists of large urban, post-industrial populations living in proximity to productive agricultural areas. The variables that load onto "Farms on the Cutting Edge" make sense in light of Heimlich and Anderson's 2001 study that identifies intensive farm operations

Table 4.2. Model Summary

Model	Significance	R	R-squared	Adjusted R-squared
Five factors		.759	.577	.541
1	.000			
2	.002			
3	.225			
4	.015			
5	.118			
Three factors		.741	.548	.526
1	.000			
2	.002			
3	.017			

Table 4.3. Component Loadings for Variables

	Component				
	1	2	3	4	5
Variable	Farms on the Cutting Edge	Big Bountiful Farms	Pennsylvania State University Syndrome	Mountain Retreats	Farm Loss
% population urban, 2000	.898				
% population with bachelor's degree or higher	.838				
value of agricultural land and buildings, 1997	.825		-.336		
% of workforce employed in white collar jobs, 1997	.796				
% of farms selling <$10,000, 1997		-.894			
% of state dairy cows		.805			
% of farmers working off-farm >200 days in 1997		-.778			
average value of agricultural goods sold per acre, 1997	.511	.734			
% land area in farms, 1997		.684			.529
% of Republican voters, 2000		.635	-.307		
% of workforce employed in county of residence, 2000			.860		
% population below poverty level	-.528		.630		
% change in population, 1990-2000			-.457	.711	
per capita travel expenditures, 2000				.710	
% of population that did not change residence, 1995-2000	.503	.328		.601	
% farmland lost, 1969-1997					.879

Extraction Method: Principal Components Analysis. Rotation Method: Varimax with Kaiser Normalization

and inflated land values, which are traits of areas where productive farmland lies on the urban fringe.

The second factor, "Big Bountiful Farms," has a high negative loading of percent of farms selling less than $10,000 annually and the percent of farmers working off the farm for more than 200 days annually. These loadings indicate low percentages of part-time and hobby farms. High positive relationships include percent of the state dairy cows in each county, average value of agricultural goods sold per acre, percent of the county's acreage in farmland, and percent of the voters who are Republicans. A weaker relationship exists for percentage of the population who did not change residence between 1995 and 2000. "Big Bountiful Farms" are areas where agriculture remains strong but also where urbanization pressures are in the earliest stages and quickly escalating.

"Big Bountiful Farms" may be influenced by a variable not considered in the analysis, the percent of each county with soils that developed from limestone. Percy Dougherty, a professor of Kutztown University, believes an observer can easily distinguish between a limestone valley and a shale one because the limestone valley is dotted with cultivated farms while a shale valley is covered in trees (2004).

Component three, "Pennsylvania State University Syndrome," is a mix of weak clues, including a negative relation between the dependent variable, the percent of farmland with conservation easements, and value of agricultural land and buildings, percent of voters registered Republican, and change in population between 1990 and 2000. The loadings are positive for the percent of workforce employed in the county of residence and percent of the population below the poverty level. This component

indicates small urban areas isolated from Pennsylvania's two major cities. "Pennsylvania State University Syndrome" includes Centre County, where a population of over 40,000 Penn State students increases the poverty rate and much of the workforce is employed by the university.

Component four, "Mountain Retreats," has high loadings of population change between 1990 and 2000, per capita travel expenditures, percent of the population that did not change residence between 1995 and 2000. "Mountain Retreats" encompasses places with small and quickly growing populations that are attractive to outsiders as vacation spots, locations for second homes, or bedroom communities for New York and New Jersey. Monroe and Pike Counties score high on the "Mountain Retreats" component because they have the fastest growing populations in the state. Commuters from New York find the beauty of the Poconos and the lower house prices irresistible. If the analysis is run without Monroe and Pike Counties, the "Mountain Retreats" component becomes insignificant in explaining variation in the dependent variable.

Component five, "Farm Loss," is a collection of two types of areas. One type consists of highly urbanized counties where agricultural decline is severe and open space preservation is more popular than farmland preservation. Counties located near Pittsburgh and Philadelphia are examples. The second type of area consists of mountainous counties where large acreages of marginal farmland have gone out of agricultural production. The state's southwestern counties and northern tier of counties are examples. While "Farm Loss" imparts little about where farmland is preserved, it supports the idea that individuals must perceive farmland as irretrievably lost to urban development if a preservation movement is to emerge.

County Component Scores and Participation in Conservation Easement Programs

In principle components analysis, each county receives a score for each factor. The scores measure how well a component describes a county. Component scores are similar to Z-scores in that they are standardized, normally distributed, and can be compared across factors. In considering the strength of component scores, sixty-eight percent fall between plus and minus one standard deviation, ninety-five percent are between plus and minus two, and ninety-nine percent between plus and minus three (Johnston 1990, 152). To compare component scores to farmland acres preserved, Pennsylvania's counties are split into five groups based on the percent of farmland preserved. The five groups were created using ArcView GIS to classify and map the dependent variable, splitting the range of values at natural breaks in the data. The groups are lettered A through E, with class A counties having the greatest percent of preserved land and class E counties having the least (Table 4.4).

Group E consists of fourteen counties which had no preservation program as of 2001 and six with low acreages of preserved farmland (Table 4.5). Many of these counties are located in the northwestern and north-central sections of the state, where much of the land is forested and population is low. The Allegheny National Forest covers over 513,000 acres, and there are several large state forests and wilderness areas. The counties without exception score below zero (the mean) on the "Farms on the Cutting Edge" factor. This means that development pressure is low or nil, and the few farms are extensive operations. Not surprisingly, most of the counties score below zero on the "Big Bountiful Farms" factor. Only Bradford, Tioga, Somerset, Crawford, and Huntingdon counties rate more highly in "Big Bountiful Farms" than their membership in

Table 4.4 Conservation Easement Purchase Participation Groups

Group	Percent of Farmland Preserved	Number of Counties
1	0.0 - 0.3%	20
2	0.3 - 2.2%	17
3	2.2 - 4.3%	12
4	4.3 - 9.2%	12
5	9.2 - 14.4%	5

Table 4.5. Component Scores for Group E Counties

	Component				
	1	2	3	4	5
County	Farms on the Cutting Edge	Big Bountiful Farms	Pennsylvania State University Syndrome	Mountain Retreats	Farm Loss
Armstrong	-0.78	-0.54	-0.68	-1.08	0.06
Bradford	-1.14	1.28	0.51	-0.21	0.87
Cameron	-0.67	-0.74	0.27	-0.51	-1.74
Clarion	-0.70	-0.54	0.91	0.47	0.25
Clearfield	-0.32	-1.12	0.04	-0.17	-0.99
Crawford	-0.75	0.35	0.84	0.30	0.33
Elk	-0.15	-1.48	-0.19	-1.41	-2.27
Forest	-1.98	-0.34	0.38	3.40	-2.01
Fulton	-1.39	-0.28	-1.10	-0.76	0.65
Greene	-0.79	-1.78	0.44	-0.63	2.91
Huntingdon	-0.99	0.30	-0.38	-0.47	-4.08
Indiana	-0.36	-0.17	1.32	0.10	0.86
Jefferson	-0.85	-0.56	-0.16	-0.48	-0.29
McKean	-0.65	-0.84	0.71	0.12	-0.85
Pike	0.18	-1.11	-3.12	3.53	-0.65
Potter	-1.26	-0.04	0.04	0.58	-0.18
Somerset	-1.06	0.55	0.23	-0.32	0.16
Tioga	-1.13	0.65	0.71	0.45	0.44
Venango	-0.42	-0.99	0.54	-0.29	-0.32
Warren	-0.32	-0.50	0.42	-0.32	-1.14

Group E might warrant. Four of the exceptional counties are large, are mostly rural, and have productive soils. Bradford's component score is quite high, but the county has preserved little farmland. A lack of development pressure explains this situation. No Interstate Highway crosses the county, and Bradford's dairy farmers produce for the large New York City market. Two Group E counties, Forest and Monroe, score high on the "Mountain Retreats" factor. The counties score high on the fifth factor, "Farm Loss," which is an indication of the reversion of large acreages of agricultural land to forest.

Group D counties have preserved between 0.3 and 2.2% of their farmland (Table 4.6). Most are in the western half of the state; otherwise they have little in common. A range of issues leads counties in Group D to an interest in farmland preservation. Only Allegheny County scores high on "Farms on the Cutting Edge" factor; Juniata, Bedford, and Sullivan score low. Snyder and Mifflin Counties, which have limestone valleys, are the only ones to rank high on the second factor. Allegheny, Beaver, Fayette, and Washington all score below –1.0. Allegheny, the location of Pittsburgh, is a county where most of the value of agricultural land is development potential. Allegheny County did not appropriate any money in 2001 for farmland preservation. However, it received over one million dollars from the state program that doles out funds based on realty transfer tax revenues. Several Group D counties in the east-central part of the state contain anthracite coal and limestone valleys. The anthracite mines that drove the counties' economies for decades are now defunct for lack of demand, leaving the area economically depressed. Most land in the anthracite valleys lies idle, while the limestone valleys support small farm communities.

Table 4.6. Component Scores for Group D Counties

	Component				
	1	2	3	4	5
County	Farms on the Cutting Edge	Big Bountiful Farms	Pennsylvania State University Syndrome	Mountain Retreats	Farm Loss
Allegheny	1.82	-1.49	1.50	-0.31	-0.72
Beaver	0.73	-1.36	-0.35	-1.14	-0.41
Bedford	-1.22	0.55	-0.41	-0.48	0.09
Cambria	0.01	-0.72	0.88	-1.19	-0.63
Columbia	0.03	-0.28	0.83	-0.02	1.23
Erie	0.69	-0.07	1.90	0.15	0.92
Fayette	-0.38	-1.24	0.80	-0.51	0.24
Juniata	-1.11	0.96	-1.25	-0.43	0.20
Lawrence	0.05	-0.36	0.46	-0.89	0.23
Luzerne	0.77	-0.80	0.87	-0.56	-0.91
Mifflin	-0.73	1.29	0.49	-0.58	-0.86
Montour	-0.29	0.42	-0.63	-0.31	1.53
Northumberland	-0.38	0.30	-0.23	-0.98	0.11
Snyder	-0.71	1.39	-0.54	-0.56	-0.71
Sullivan	-1.45	-0.18	-0.30	0.53	-0.32
Washington	0.31	-1.20	-0.20	-1.02	1.53
Wyoming	-0.92	0.35	-0.92	0.12	0.72

Group C counties, for various reasons, have shown a limited interest in the state preservation program. The counties are sprinkled across the state, and between 2.2 and 4.3% of their farmland is preserved (Table 4.7). Most of these counties score close zero on the "Farms on the Cutting Edge" factor, but Delaware scores high while Susquehanna scores low. Delaware is a small urban county that has intensive agriculture. Susquehanna is a large rural county with little agriculture and development pressure. For the "Big Bountiful Farms" factor, Franklin is the only one to score above one standard deviation. Most Franklin County farmers are in the Great Valley and sell milk to Baltimore, Washington, and Philadelphia. Centre County scores high on both "Pennsylvania State University Syndrome" and "Mountain Retreats" factors. Delaware and Perry Counties, where many of the residents commute to neighboring cities, score low on "Pennsylvania State University Syndrome" while other counties are close to the mean. On the "Farmland Loss" factor, Delaware and Carbon score low and Wayne and Susquehanna score high. Delaware and Carbon score low, because little farmland is lost in urban counties. Wayne and Susquehanna's scores indicate counties where large amounts of marginal farmland have gone out of production. Franklin County contains Pennsylvania's southernmost portion of the Great Valley and supports a strong dairy community. Franklin County is experiencing the first exurban surges of growth from Washington, D.C. and Baltimore (Benhart 1992, 44). Delaware is one of the state's most urban counties. Residents have preserved some of the remaining farmland, but they will make little headway in the future. Most Delaware citizens are more concerned with preservation of open space than farmland. The county made no appropriations for farmland preservation in 2001. Centre County is more active than it would be without

Table 4.7. Component Scores for Group C Counties

	Component				
	1	2	3	4	5
County	Farms on the Cutting Edge	Big Bountiful Farms	Pennsylvania State University Syndrome	Mountain Retreats	Farm Loss
Butler	0.50	-0.78	-0.45	0.57	0.68
Carbon	0.04	-0.95	-1.29	-0.36	-1.07
Center	0.96	0.23	3.19	2.63	0.29
Clinton	-0.31	0.06	0.49	0.31	-0.97
Delaware	2.69	-0.22	-1.84	-0.61	-1.90
Franklin	-0.03	1.86	0.08	-0.23	-0.42
Lycoming	0.32	-0.02	1.15	0.22	-0.56
Mercer	-0.03	-0.07	0.89	-0.26	0.61
Perry	-0.60	0.22	-2.27	-0.41	0.02
Susquehanna	-1.34	0.42	-0.96	-0.14	2.34
Wayne	-0.87	0.02	-0.62	1.36	1.17
Westmoreland	0.67	-0.80	-0.21	-1.00	-0.09

the influence and support of Pennsylvania State University's strong agricultural economics program. Susquehanna and Wayne Counties are feeling the effects of their high scores on the "Farmland Loss" factor, sparking more preservation than might otherwise occur.

Group B counties have a lively interest in farmland preservation. Each has preserved from 4.3 to 9.2% of its farmland (Table 4.8). Every county except Schuylkill and Union score positive on "Farms on the Cutting Edge," while six score above one standard deviation. Only three counties score below zero on "Big Bountiful Farms." Blair and Chester score high, and Lancaster score is above four standard deviations. Lancaster County has preserved the most acreage. However, a large amount of farmland is owned by Amish, who do not accept government payments and do not participate in public preservation programs. For this reason, Lancaster County has a smaller percentage of farm acreage than one might expect in conservation easements.

Northampton is in Group B and is in close proximity to Philadelphia and New York. Commuting distance is a long drive or train ride to each city. The recent loss of Northampton's major employer, Bethlehem Steel, has left the county in an economic depression. Northampton County is in the easternmost extension of the Great Valley, but the area has long been dependent upon manufacturing. Residents are quite concerned with the effects of economic restructuring. As the county's economy recovers and the Allentown-Bethlehem-Easton Metropolitan Area continues to spread along the Great Valley, interest in farmland preservation is high. All counties except Lackawanna, Blair, and Union are east of the Ridge and Valley province and have a strong tradition of farming. Threatened regional identity from agriculture encourages commitment to

Table 4.8. Component Scores for Group B Counties

	Component				
	1	2	3	4	5
County	Farms on the Cutting Edge	Big Bountiful Farms	Pennsylvania State University Syndrome	Mountain Retreats	Farm Loss
Adams	0.02	0.65	-1.15	0.59	0.71
Blair	0.16	1.05	1.23	-0.21	0.87
Bucks	2.10	-0.25	-1.54	-0.23	0.66
Chester	2.25	1.53	-1.03	0.26	0.82
Cumberland	1.27	0.78	0.10	0.79	0.43
Dauphin	1.21	-0.05	0.68	1.21	0.24
Lackawanna	1.06	-0.91	0.82	-0.66	0.02
Lancaster	1.00	4.28	-0.83	-0.35	-0.83
Lebanon	0.57	1.91	-0.83	-0.71	-1.08
Northampton	0.97	-0.27	-0.55	-0.21	1.57
Schuykill	-0.07	0.20	-0.44	-1.00	-1.51
Union	-0.10	1.29	-0.25	0.89	-0.42

conservation easement purchases. The counties are politically conservative, but the conservatism does not extend to viewing conservation easements as government interference in property rights.

Group A contains only five counties (Table 4.9). This elite group has preserved 9.2 to 14.4% of its farmland and contains the counties with the highest proportions of preserved farmland in the state. The identities of the five counties hold surprises. The absence of Lancaster County and the presence of Monroe are the most striking. Monroe had 26,000 acres in farms in 1997. The acreage is less than half the preserved acreage in Lancaster County. Only the southern end of Monroe County, which is in the Great Valley, is suitable for farming. Monroe is not the only county in Group A that has conservation easements on a large proportion of its limited farm acreage. Montgomery and Lehigh are predominately urban counties with limited acreages of productive farmland. Both have preserved one acre out of every ten. Berks County is similar to Lancaster in amount of money spent on easements and in the number of farms preserved, but Berks has conservation easements on a higher percentage of its farmland. In 1997, Berks had 200,000 acres less than Lancaster in farms, but in 2001 both counties appropriated approximately the same amount of money for preservation. The residents of Berks County are pushing preservation more strongly because the county's farmland is in greater danger. Berks is closer to Philadelphia and has better highway connections than Lancaster. While Berks identifies closely with its Pennsylvania German heritage, tradition has a more tenuous hold than in Lancaster County.

Lehigh County has lost much of its farmland. One of its commissioners recently lamented that too much prime farmland is being lost to large distribution centers

Table 4.9. Component Scores for Group A Counties

	Component				
	1	2	3	4	5
County	Farms on the Cutting Edge	Big Bountiful Farms	Pennsylvania State University Syndrome	Mountain Retreats	Farm Loss
Berks	0.88	1.14	0.48	0.03	0.37
Lehigh	1.27	0.21	0.45	0.06	1.16
Monroe	0.71	-0.91	-0.47	3.21	-0.46
Montgomery	2.21	-0.39	-0.91	0.31	0.57
York	0.77	0.12	-0.20	0.12	1.07

(Dougherty March 14, 2004). Montgomery County has also lost much of its farmland, but the bulk of the loss lies further back in history than in Lehigh. The Pennsylvania Turnpike and its northeastern extension meet in Montgomery, and the county has long had Philadelphia's suburban development. Lehigh and Montgomery are placing easements as bandages on gaping farm-loss wounds by focusing preservation efforts on a few relatively pristine pockets of farmland.

York County lies between Harrisburg and Baltimore. Its heavy industrial economy has undergone restructuring in the last thirty years, but emphasis remains on food processing plants and metallurgical factories. Impressively, York has the second largest amount of farm acres in the state and has preserved nearly ten percent of its farmland. York is the only Pennsylvania county, other than Lancaster, to mandate urban growth boundaries as part of its planning process. York's average component scores do not provide a complete picture of its level of participation in farmland preservation. The statistical model's characterization of York may be a result of its unique situation as an urban county economically devoted to manufacturing and agriculture.

Pennsylvania's Farmland Preservation Landscape

Models are never perfect. Although quantitative investigation adds to an understanding of the distribution of farmland preservation in Pennsylvania, as many questions are raised as are answered. But several generalizations can be made. First, farmland preservation is primarily an issue in the southeastern part of the state. Draw an arc along Tuscarora and Kittatinny Ridges, which mark the transition into the Ridge and Valley province of the state, and you neatly circumscribe the majority of the productive

farmland, the majority of the population, and most of the rapidly growing counties. Every county is in Group A, B, or C.[6] Southeastern Pennsylvania has long had strong ties to local market-oriented agriculture on farms that are quite small compared to those in the Midwest. This heritage of small family farms is central to the region's identity. The food processing industries, operating along side the farms, reinforce this tradition. Numerous roadside produce stands also highlight local agriculture.

Southeastern Pennsylvania does not have a lock on farmland preservation. Counties within the Ridge and Valley province have areas of productive farmland that residents value and aim to preserve. Isolated areas of agriculture often are home to groups of Amish, Mennonite, and Brethren farmers, some of whom moved from Lancaster County. Lowlands, including the Nittany Valley in Centre County and Kishacoquillas Valley in Mifflin and Huntingdon, are among the productive farming areas (Zelinsky, 2002, 391) (Figures 4.1 and 4.2). Further west in Pennsylvania, the counties on the Allegheny Plateau are members of Groups D or E. Some have no farmland preservation program, and others spend only the state grants that come to them. As the Pittsburgh-New Castle Combined Statistical Area continues to hemorrhage jobs and population, the counties will continue to have little interest in preserving farmland. Coal lies close to the surface and has more important impacts on the region's economy than agriculture.

[6] The counties to the south and east of this arc are Delaware, Bucks, Montgomery, Chester, Northampton, Lehigh, Berks, Lancaster, York, Lebanon, Dauphin, Cumberland, Adams, and Franklin.



Figure 4.1. Agricultural Community Identity in Kishacoquillas Valley, Mifflin County. Photo by author, 2005.



Figure 4.2. Typical Agricultural Landscape in the Ridge and Valley. Amish and Mennonite farms outside of Belleville, Mifflin County. Photo by author, 2005.

Areas where farms are in conflict with expanding urban areas are likely to have preservation programs. However, this generalization must be evaluated carefully, for exceptions exist. As revealed through principle components analysis, urban encroachment and farm productivity play significant roles in explaining variation in the location of preserved farmland. However, the five factors identified in this study account for just over half of the variation. A county case study and the evolution of its farmland preservation program augments the quantitative findings and provides further insight into where farmland is preserved and why people want to conserve it.

CHAPTER FIVE

Agricultural Land Preservation in Lancaster County

To obtain a more comprehensive understanding of the principle components analysis, it is important to examine a particular county. Lancaster County is ideal because of its strong agricultural economy and its commitment to conservation easements. In the previous chapter, Lancaster County's percentage of farmland with conservation easements indicates that it is a Group B county. Group B counties are characterized by active involvement in the state's conservation easement purchase program, but are not the top conservers. This chapter investigates Lancaster County's Group B ranking in light of its component scores and its physical and cultural geography. The study examines the role of conservation easements, other farmland preservation methods, and points of contention that shape Lancaster's landscape.

Since the early 1700s, Lancaster has been the most productive agricultural county in Pennsylvania. The county continues to lead the nation in direct sales of farm produce to households. Also, since the early 1700s, Lancaster has been home to a growing population of Amish, Mennonite, and Brethren, whose agrarian culture is closely identified with the county. Many people see the future of the county's farms as synonymous with the area's identity and heartily support farmland preservation.

Physical and Cultural Setting

Lancaster County lies in the Piedmont physiographic province. John Fraser Hart notes that it is one of "the only extensive tracts of truly good farming land on the eastern

seaboard of the United States (1991, 19)". Lancaster County contains 941 square miles, and in 2000 was home to 470,658 people (Lancaster County Growth Tracking Report 2002, 11). Approximately 50,000 of the residents are members of the Plain churches, which include the Old Order Amish, Mennonite, and Brethren sects and other more progressive groups (Kraybill 2001, 15).[7] There are sixty municipal divisions within the county: eighteen boroughs, forty-one townships, and one city. The city of Lancaster is the county seat (Figure 5.1).

Lancaster County is relatively flat to gently rolling and can be divided into three broad bands based on geology. The northern third of the county consists of shale and sandstone beds shaped into low hills. The southern third consists of low hills of metamorphic rock. Most of the county's agriculture is on the middle third, a limestone valley (Figure 5.2). Hagerstown loam covers much of the central valley and with care, can produce exceptionally high crop yields. Agriculture in the central Lancaster valley is interrupted by the Welsh Mountains to the east, the Chickies Rock formation to the west, and the city of Lancaster in the middle.

Agricultural uses account for nearly seventy percent of the county's land area, but urban uses are increasing. Agricultural lands are spread throughout the county. Seventy-five percent of the soils in the county are rated Classes I, II, and III by the Natural Resources Conservation Service. Fifty percent of the county's soils are Classes I and II

[7] Because children are not church members until they are baptized in their late teens, population figures that include children may be twice the number of reported church members. Thirty Anabaptist groups live in Lancaster County, of which the Old Order Amish make up about twenty percent. (Kraybill 2001, 15).

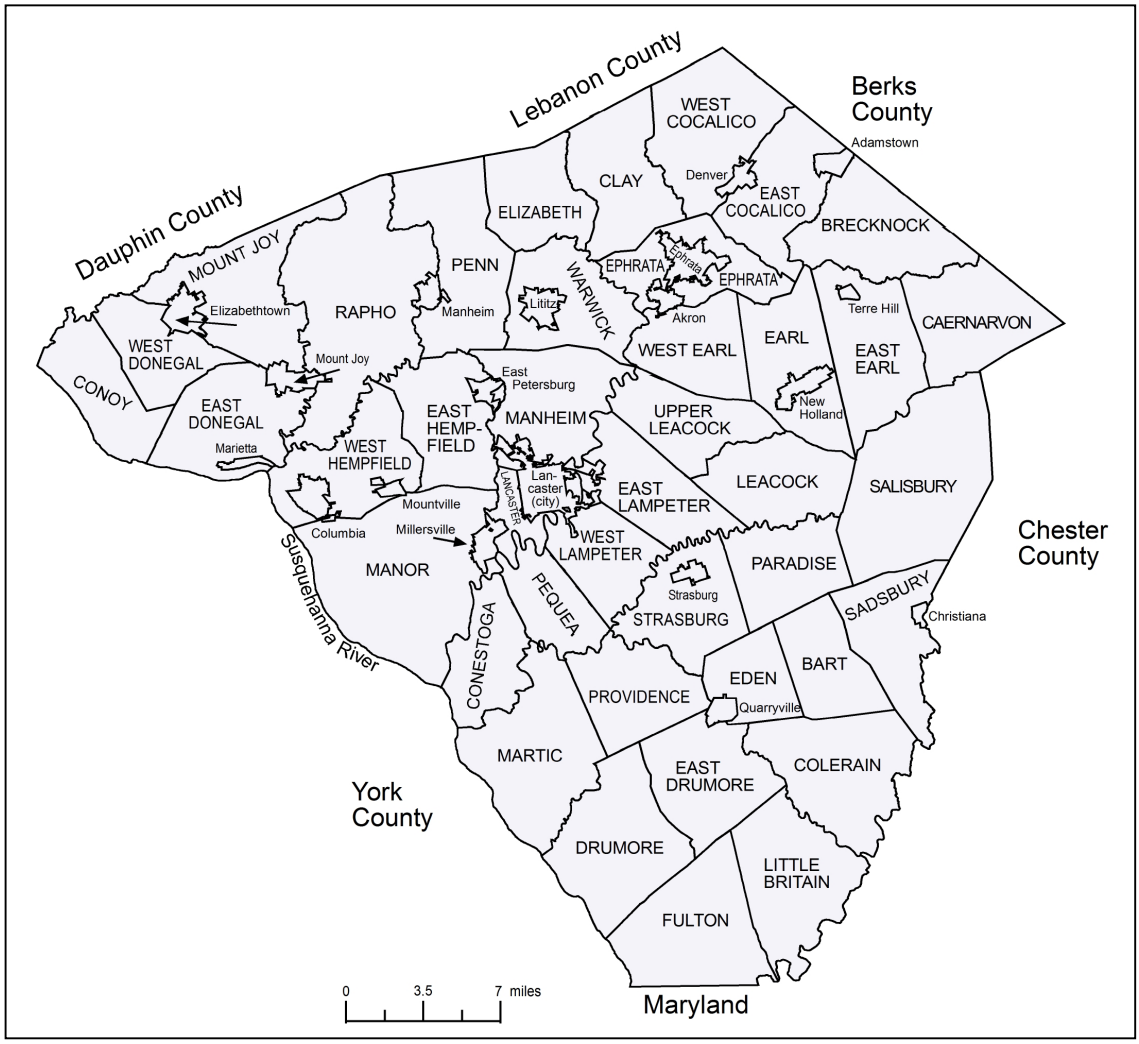


Figure 5.1. Local Governments of Lancaster County.

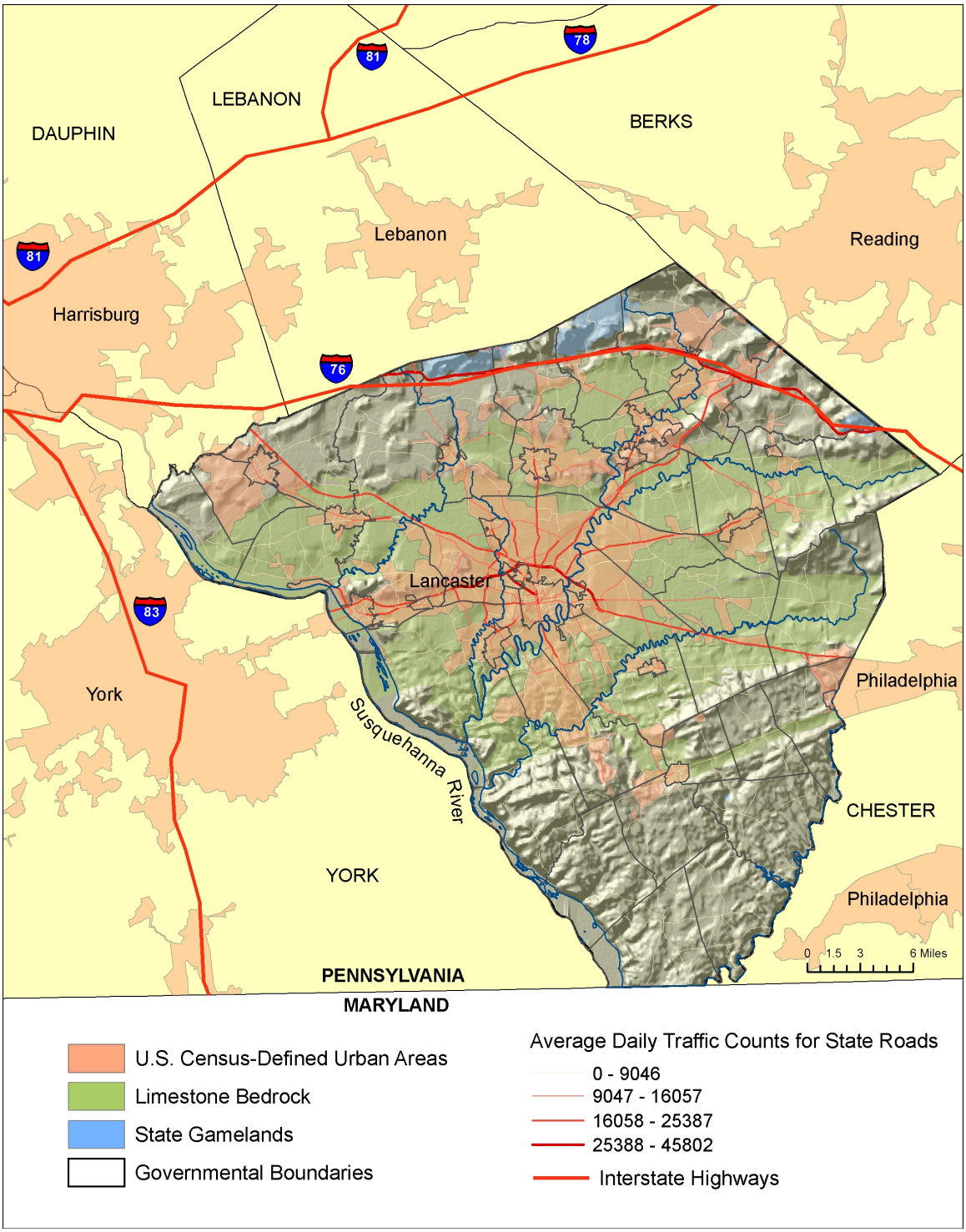


Figure 5.2. Regional Setting of Lancaster County. Source: GIS data from Pennsylvania Department of Conservation and Natural Resources and Pennsylvania Department of Transportation.

and are considered prime farmland (Daniels 1998, 4). A map of the county tax assessor's land use code for individual parcels reveals the distribution of agricultural land (Figure 5.3).

Given the county's large acreage of farmland, it is more revealing to identify and describe areas where farmland is not located. Farmless areas are wooded hills with poor soil and residential land near the Susquehanna River and Octoraro Lake, other urban areas, and public land. The Pennsylvania Game Commission manages a wide swath of forestland in the northern hills. Few farms are found on the poor soils of Welsh Mountain. Rural subdivisions line Octoraro Lake and Octoraro Creek in Little Britain Township. Elsewhere, expansion of urban areas takes fertile farmland out of production because developers desire well-drained level land as much as farmers.

The majority of the Plain population is concentrated east of the city of Lancaster. Amish farms cover most of Leacock township and much of Upper Leacock, East Lampeter, Paradise, Strasburg, Salisbury, Eden, Sadsbury, and Bart townships (Kraybill 2001, 11). Scholars estimate that the Amish in Lancaster are reproducing at a rate that doubles the population every twenty years. While not all Amish who are born in Lancaster stay, the population pressure contributes to a tight market for farmland and the search for new crops and production methods that make smaller farms economically viable. Concentrations of non-Amish farmland are in the northwestern corner of the county and south of the city of Lancaster.

The city of Lancaster is the urban hub of the county. Almost all major transportation routes pass through or near the city (Figure 5.2). The Pennsylvania Turnpike crosses ten miles north of the city and connects Lancaster to major urban areas,

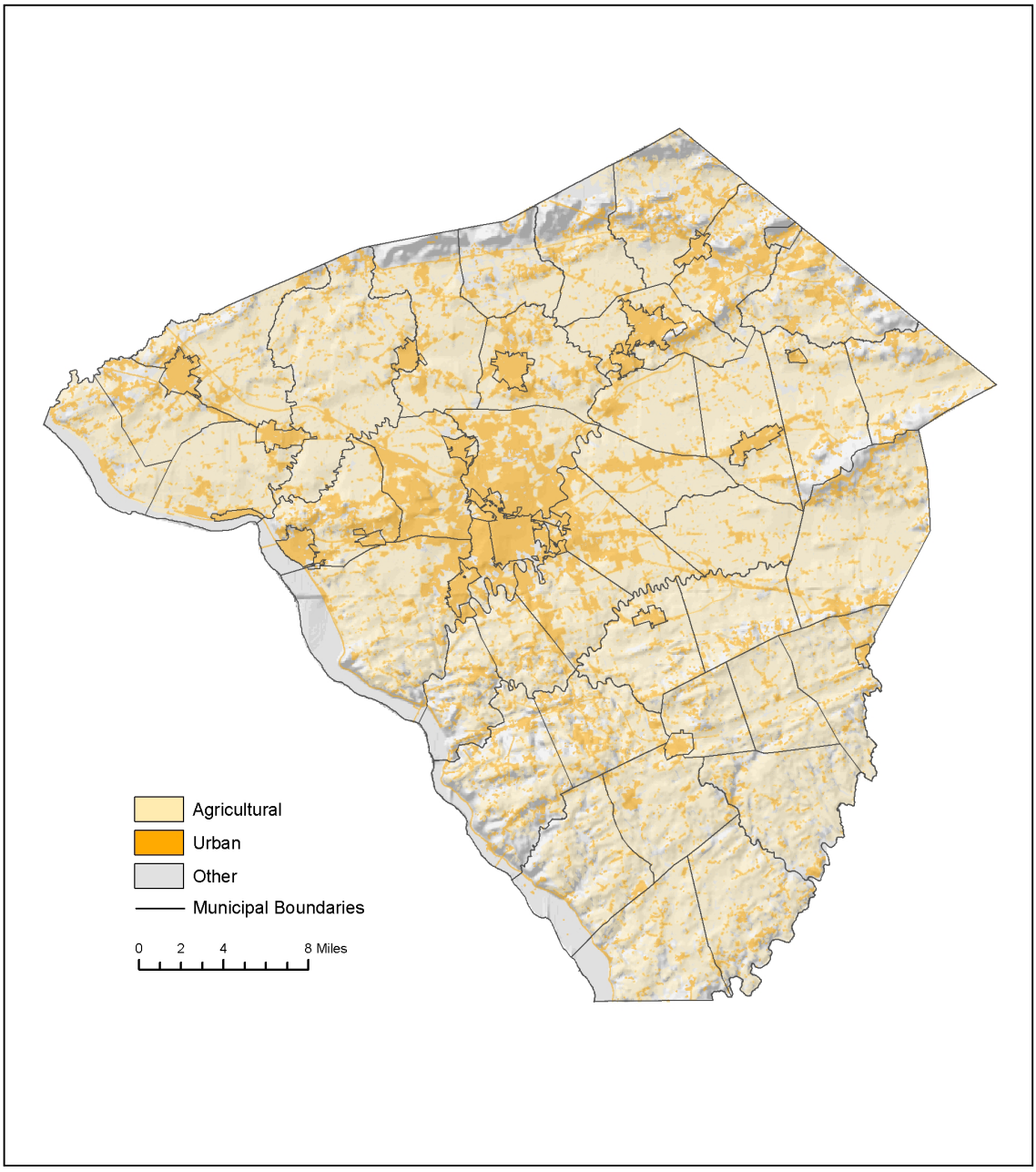


Figure 5.3. Distribution of Urban and Agricultural Land Uses. Source: Lancaster County GIS Deparment.

including Harrisburg, Reading, and Philadelphia. United States Highway 30 provides a major, albeit congested, east-west axis. United States Highway 222 connects Lancaster and Reading, while Pennsylvania Route 283 connects Lancaster and Harrisburg. Pennsylvania Route 23 crosses the eastern half of the county from the city of Lancaster to the Berks County border. The future expansion and realignment of the Route 23 corridor through pristine farmland is a continuing source of controversy.

The population of the city of Lancaster and its urbanized area grew from 193,000 to 323,000 from 1990 to 2000 (Lancaster County Growth Tracking Report 2002, 11). Homes for new residents and the expansion of commercial enterprises are the biggest threats to the county's 392,000 acres of farmland (U.S. Census of Agriculture 1997). Much new development clusters around the northern and northeastern edges of the city, particularly in Manheim and Warwick townships, and in the northeastern corner of the county, where urban growth infiltrates from neighboring Berks County.

Between 1990 and 2000, Lancaster County's population increased by 47,836, with a third of the growth attributable to net migration (Lancaster County Growth Tracking Report 2002, 11). Manheim and Warwick townships added the most people, but Mount Joy, West Lampeter, West Cocalico, East Cocalico, Brecknock, Warwick, and Little Britain townships grew the most proportionally. Pequea and Eden townships and the boroughs of Manheim, Millersville, Marietta, Columbia, and Terre Hill lost population (Figures 5.4 and 5.5).

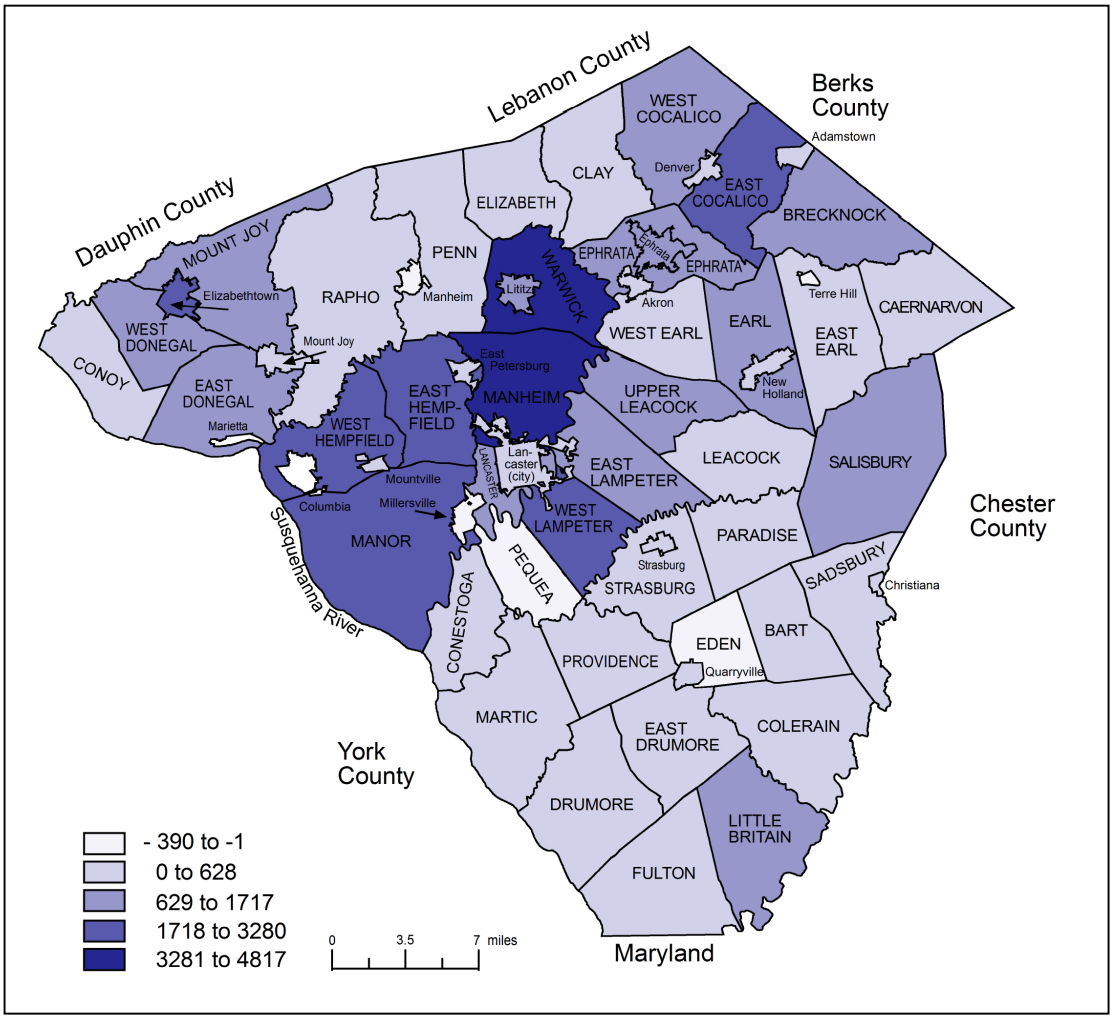


Figure 5.4. Population Change in Lancaster Municipalities, in Absolute Figures, 1994 – 2001. Source: Lancaster County Growth Tracking Report, 2002.

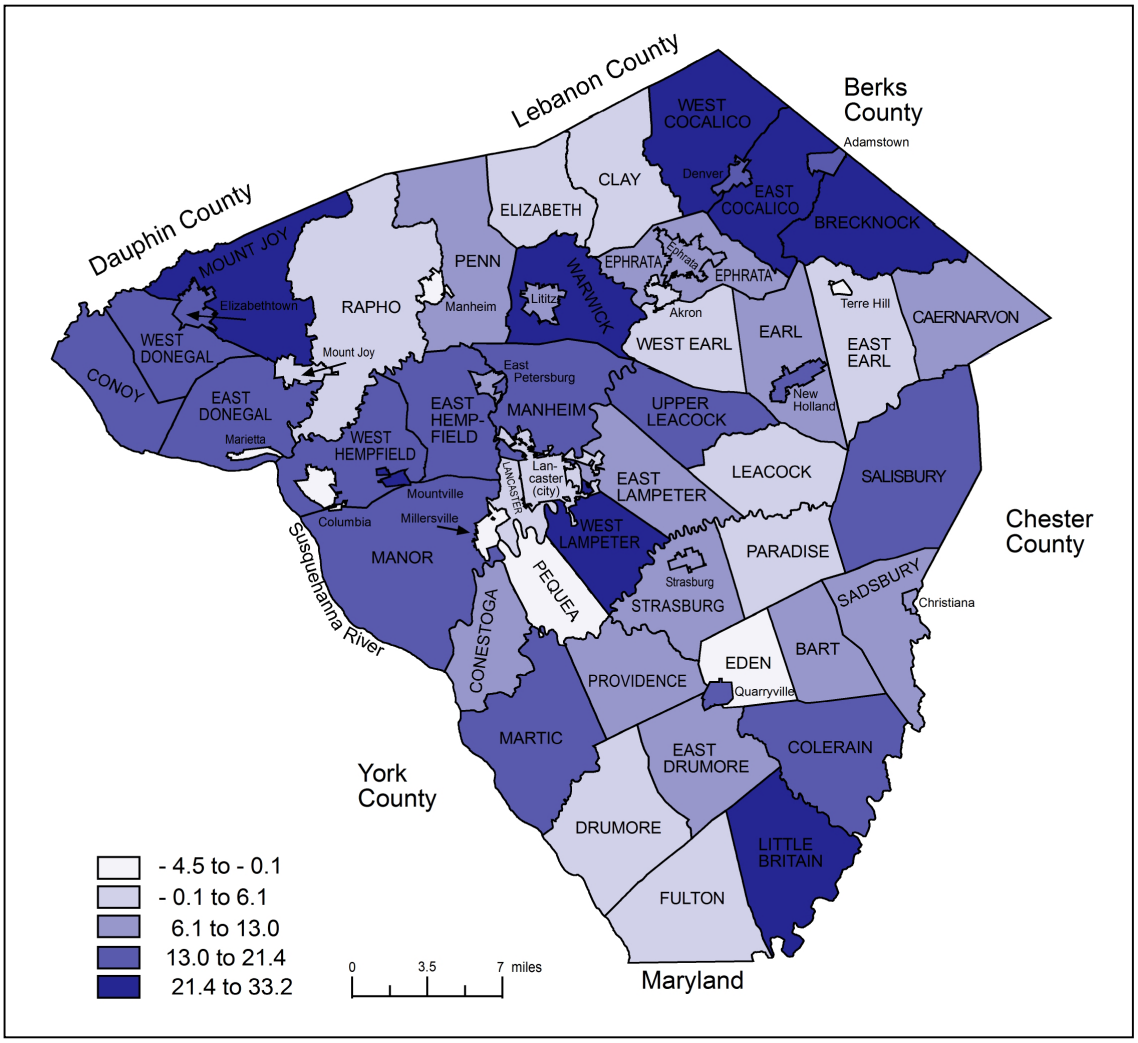


Figure 5.5. Percent Population Change in Lancaster Municipalities, 1994-2001.
Source: Lancaster County Growth Tracking Report, 2002.

Administration of the Conservation Easement Purchase Program

Lancaster County's Agricultural Preserve Board is the governmental entity responsible for coordinating the county's preservation program with the state program. The Agricultural Preserve Board processes landowners' applications, ranks farmland, and purchases conservation easements with a mix of state and county funds. Lancaster County's Agricultural Preserve Board is certified by the state's Agricultural Preservation Board and must conform to guidelines to maintain access to state funds.

If a farmer wishes to obtain a conservation easement on his land, his or her first action is to submit an application to the county Agricultural Preserve Board. Applications typically are not solicited. The application is ranked using the state Land Evaluation and Site Assessment system. Newly ranked high-value farmland is preserved before lower-quality land that has been waiting several years. The Agricultural Preserve Board staff estimates how many easements will be initiated per year, given funding level and average easement price. The Board notifies applicants of the estimated year in which their farms will be preserved (Program Guidelines 2001, 4).

If a farm is not in an Agricultural Security Area at the time of application, the Agricultural Preserve Board works with the applicant to add the property to an existing Agricultural Security Area or to create a new one. The Board helps the applicant develop a conservation plan, and an appraiser determines the easement value of the land. An Agricultural Preserve Board staff member then meets with the landowner and presents an agreement of sale (Program Guidelines 2001, 6). Creating an Agricultural Security Area is a six-month process, and creating a conservation plan can take from one to several

months. Once the appraisal process begins, settlement can be expected in four to six months.

Nationally, land owners meet new or proposed easement purchase programs with apathy or suspicion. Jeffrey Young found wariness and mistrust were crucial in the narrow defeat of a referendum that proposed the creation of a farmland preservation program in Minnesota (Young, 2004). Because Lancaster County has been preserving farms since the mid-1980s, residents and farmers are comfortable with the easement purchase system. The county program predated the state program by several years. Heidi Schellenger of the Lancaster Farmland Trust and Matthew Knepper of the Agricultural Preserve Board believe that many people who buy farms in Lancaster County do so with the thought of applying for a conservation easement (July 14, 2003).

Participation in the Conservation Easement Purchase Program

The principle components analysis reveals two significant scores for Lancaster County: "Farms on the Cutting Edge" and "Big Bountiful Farms" (Table 5.1). Lancaster County's score for the "Farms on the Cutting Edge" component is 1.0048, with statewide scores ranging from -1.9773 to 2.689. High scores for this component identify counties with large urban, post-industrial populations living in close proximity to productive agricultural areas. However, this characterization is only partially accurate for Lancaster County.

Although the county has a large urban population and productive agricultural areas, the county's component score on "Farms on the Cutting Edge" is not particularly

Table 5.1. Conservation Easement Purchase Participation Group and Component Scores for Lancaster and Neighboring Counties

	Group	Farms on the Cutting Edge	Big Bountiful Farms
Lancaster	B	1.00448	4.27932*
York	A	0.76631	0.12158
Dauphin	B	1.21879	-0.0503
Lebanon	B	0.57392	1.91074
Berks	A	0.88046	1.13686
Chester	B	2.25285	1.52736

* Highest score of all counties.

strong. Nine counties score higher than Lancaster. The highest component scores were Delaware, Chester, Montgomery, and Bucks counties, which contain Philadelphia suburbs. Agriculture thrives in these counties within tightly circumscribed niches. Market gardening of specialized crops grown intensively is popular in Philadelphia's suburban counties. Such specialization is equally common in Lancaster County. The difference is that Lancaster's agricultural community is far stronger and Lancaster's farms are not as liable to fall victim to the impermanence syndrome.

Lancaster County's component score on the "Big Bountiful Farms" component indicates that the strength of its agricultural community, the market value of agricultural products, the percent of the county's acreage in farmland, the percent of the state dairy herd, and the percent of the voters who are Republicans are higher than average. Lancaster County scored two and a third points higher on "Big Bountiful Farms" than Lebanon County. Lancaster also has the highest average market value of goods sold per agricultural acre and the lowest percentage of farms selling less than $10,000 annually. The county has the highest percent of acreage in farmland of any county in the state. These figures indicate a county where most farmers are in the business to obtain a livelihood. The county system for purchasing conservation easements on farmland has wide acceptance among Lancaster's non-Amish farmers. However, given the geographic circumstances of each township and the nature of municipal politics, some townships are more active than others in protecting land.

Distribution of Conservation Easements

A statistical analysis cannot be designed for the sub-county level because crucial data, particularly figures for agricultural productivity, are not reported at the township and borough level. Lancaster County's municipalities can be divided into classes based on the percent of acreage that is preserved, and the nature of the classes can be investigated. The city of Lancaster and all boroughs are excluded from the analysis, for program policy does not allow the purchase of easements within their borders.

The data analyzed are properties with conservation easements in a GIS database maintained by the Agricultural Preserve Board. The database includes easements purchased by the Agricultural Preserve Board, private trusts, and other organizations in the county. According to Agricultural Preserve Board, the database is eighty percent accurate. Using ArcView geographic information system software, I derived total acres in each township and the acreage with conservation easements.

Using ArcView geographic information software, the municipalities are divided into five classes based on natural breaks in the data. Class One consists of townships with the least proportion of land preserved by conservation easements, while Class Five consists of townships with the greatest (Figure 5.6). The easternmost townships of Brecknock, Caernarvon, and Salisbury are in Class One. None has more than two percent of its land safeguarded by easements. Upper Leacock, Earl, and West Earl Townships are in Class Two and contain the Mill Creek Valley. The three townships have a concentration of land in conservation easements, but are surrounded by townships with few easements. The distribution is explained by State Route 23 and the considerable development pressure it engenders. A contentious fight over the expansion and

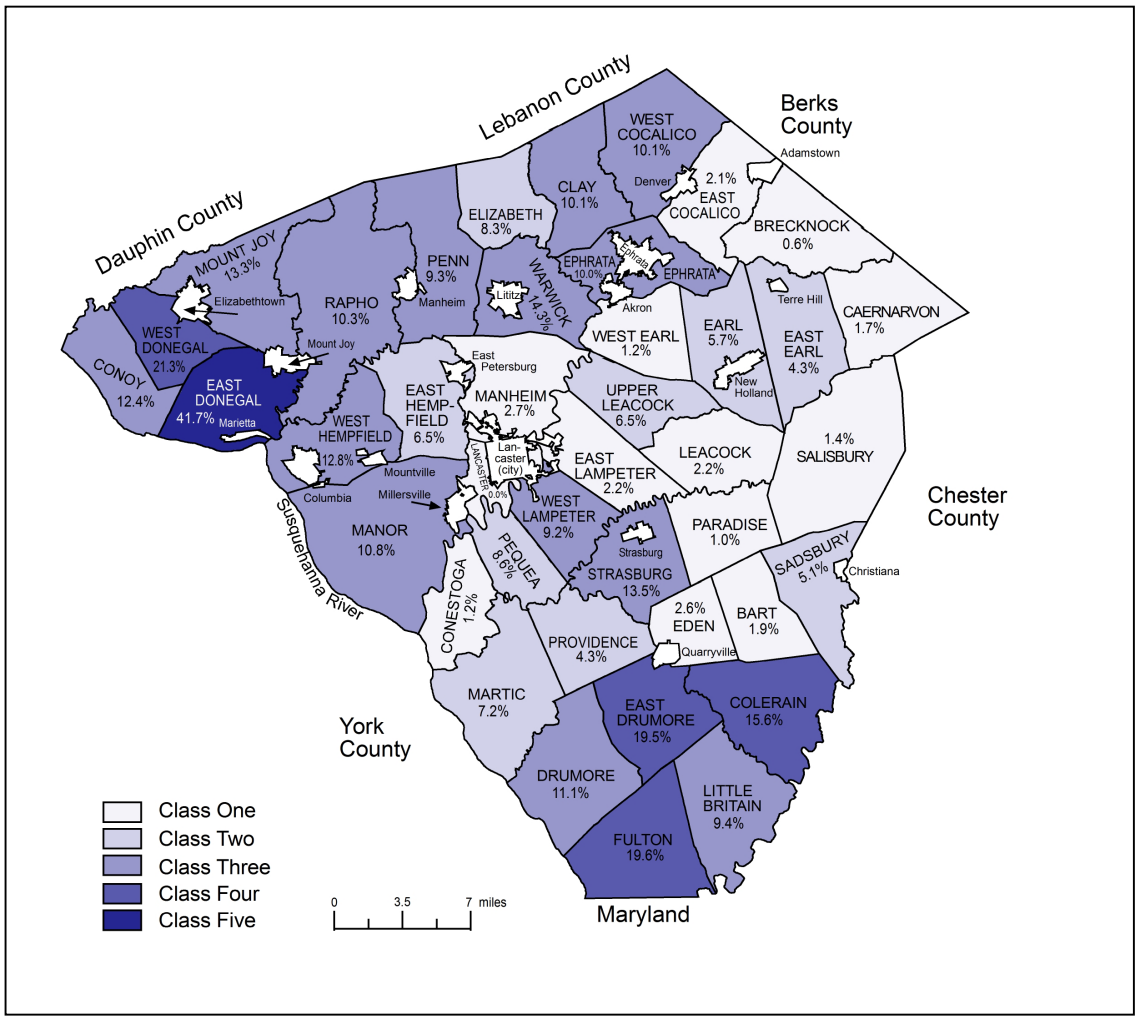


Figure 5.6. Lancaster County Townships Classified According to Land in Conservation Easements, 2003. Source: Lancaster County GIS Department.

realignment of Route 23 has raged for several decades. The director of the Lancaster Farmland Trust identified Mill Creek Valley as one of the areas most in need of agricultural land preservation (Schellenger 2003). The valley's precarious situation has led to concerted efforts by county officials and the Lancaster Farmland Trust to protect land proximate to Route 23.

Most of the townships in the Amish heartland have few conservation easements. Only West Lampeter and Strasburg Townships, in Class Three, have concentrations. Three Class Four townships in the southern tip of the county, along with two Class Three townships, have an expansive area where ten to twenty percent of the land is in conservation easements. A band with many Class Three townships, one Class Four, and one Class Five lies west of the city of Lancaster. Tiny Elizabeth township is not as active as its neighboring townships in conserving agricultural land. West Donegal, with one in five of its acres preserved, and East Donegal, with nearly one in two acres preserved, have the largest concentration of conservation easements in the county.

Other Methods for Preserving Farmland

Conservation easements are not the only farmland preservation method used by county government. Agricultural Security Areas are more prevalent than conservation easements (Figure 5.7). Agricultural Security Areas afford less protection to farmland than conservation easements, but are easier to establish. Properties in Agricultural Security Areas receive special consideration from local planning boards and county planning efforts guide urban growth away from security areas. Lancaster County has nearly 138,000 acres of farmland are in Agricultural Security Areas. A group of

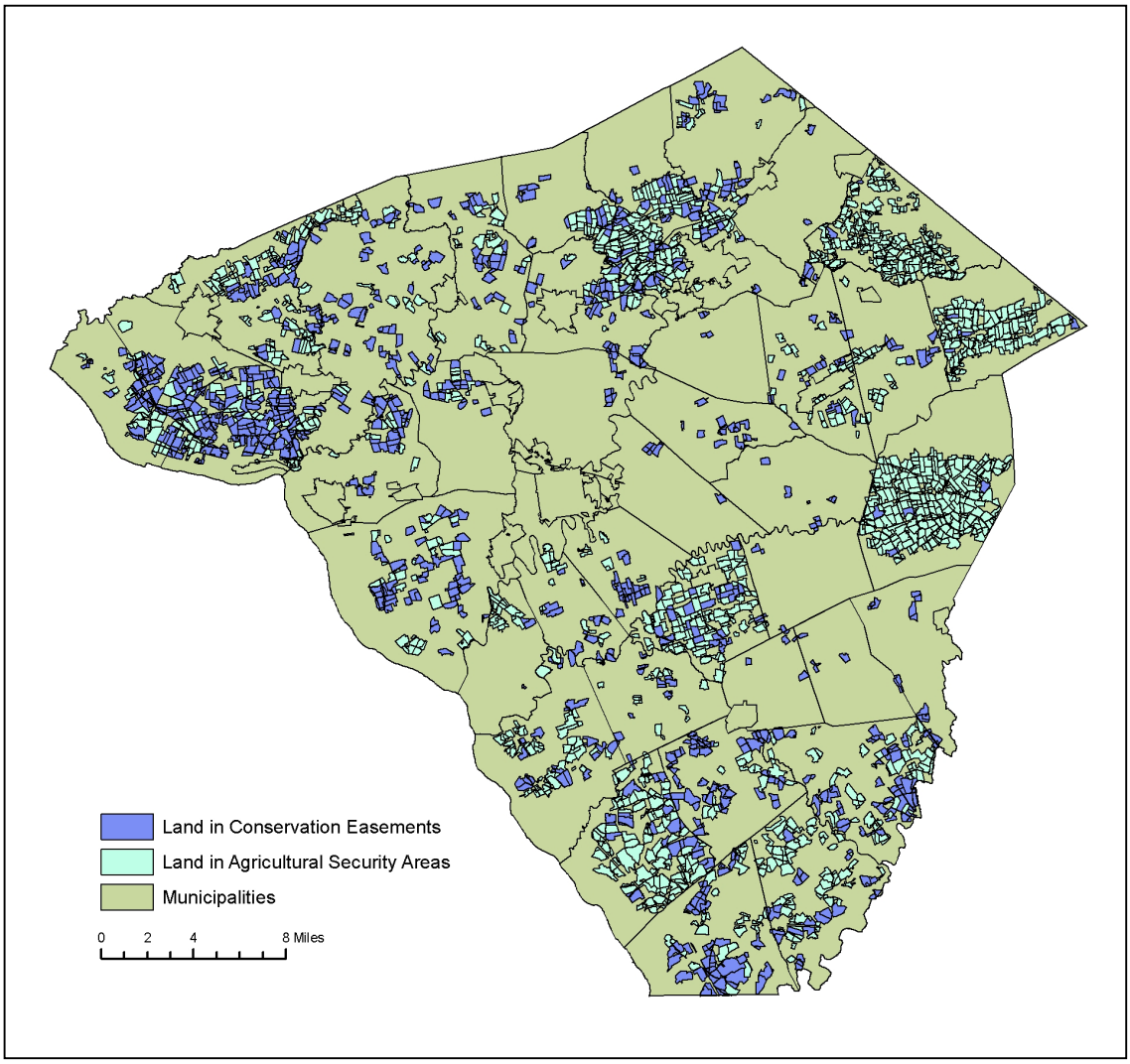


Figure 5.7. Land In Conservation Easements and Agricultural Security Areas, 2003. Source: Lancaster County GIS Department.

townships with little land in Agricultural Security Areas is spatially contiguous and in a swath to the north and east of the city of Lancaster. The swath curves southward through the heart of the Amish settlements. The Amish do not take part in political processes, and it is not surprising that little Amish farmland is in Agricultural Security Areas. The large expanses of intensively and quaintly farmed Amish lands are at the center of Lancaster tourism. The lands are healthy agricultural areas valued for their produce and other contributions to the local recreational economy. Conversion of these lands to urban uses face great scrutiny, with or without membership in an Agricultural Security Area.

East Cocalico Township is an exception. East Cocalico has little Amish farmland and is located in a section of the county dominated by townships with large areas in Agricultural Security Areas. East Cocalico's disparity is a result of its proximity to urban growth seeping into Lancaster from neighboring Berks County and the city of Reading. The township encompasses the intersection of the Pennsylvania Turnpike and U.S. Highway 222. It had a population gain of nearly thirty percent between 1990 and 2000. The western tip of the county is extremely active in the formation of Agricultural Security Areas. This area is isolated from the city of Lancaster, but it is not protected from expansion of growth from neighboring Dauphin County and the Harrisburg Metropolitan Area. A cluster of townships with Agricultural Security Areas is in the southernmost portion of Lancaster. This area is thinly settled, has a healthy portion of Amish farmland, and contains an extension of the picturesque Brandywine country of neighboring Chester County. The Brandywine Valley is a popular tourist destination associated with the paintings of the Wyeth family, winery tours, fox hunting, and Revolutionary War battlefields.

The distribution of townships with the most land in Agricultural Security Areas makes little sense at first glance. Brecknock, Caernarvon, and Salisbury townships in the eastern reaches of the county are highly active in their creation. Agricultural Security Areas in these townships are primarily in valleys to either side of Welsh Mountain, thereby directing new suburban settlement onto the poor mountain soils. Nearby Ephrata township, which is split by Ephrata borough, is a Class Five township. All of the township's Agricultural Security Areas are on the western side of the borough where, combined with land in Clay, Elizabeth, and Warwick townships, they form a large tight clump. Strasburg, Drumore, and East Donegal are the remaining Class Five townships. Strasburg's classification is odd, considering the dominance of Amish farmland. Drumore also has Amish farmland, but East Donegal has practically none. All three townships have most of their land devoted to agriculture.

Agricultural zoning keeps residential densities low by mandating large lot sizes. Most of the farmland in Lancaster County is zoned agricultural, and most townships have some form of agricultural zoning. Of the 320,000 acres zoned agricultural, 216,000 acres are classified as effectively zoned (Program Guidelines 2001, 2; Nichols 2003, 13). Planners define effective agricultural zoning as districts that limit dwellings to one per twenty or more acres. Pundits hold zoning a weak farmland protection tool because the designation of a parcel may be changed and because some farmers are unhappy with large lot requirements that limit the profitability of their land for development. However, in Lancaster County, most farmers appreciate the protection that agricultural zoning affords. Also, changes in zoning require public notice and may take several months to complete, giving time for opposition to organize and object.

Planning Efforts and Critiques

Lancaster is one of two counties in the Commonwealth where urban and village growth areas are parts of the planning process (Figure 5.8). Growth areas are regulatory perimeters used by planners and developers as guidelines for urban expansion. The growth boundary system is only partially effective. The Lancaster Growth Tracking Report for 1994-2001 states that 3,986 acres were converted to urban uses inside urban and village growth areas. In contrast, 6,382 acres were converted outside of the growth boundaries. Only twenty-six percent of the 6,382 acres were developed in rural communities that had not created urban or village growth areas. However, officials point out that, while nearly ten thousand acres were commercially or residentially developed between 1994 and 2001, over thirty thousand acres were permanently preserved through conservation easements or as parkland.

Lancaster homebuilders express concern over the relationship between preserved farms and urban growth boundaries (Nichols 2003, 14). While the county does not purchase easements inside urban growth boundaries, private entities do. The purchasing practices can result in isolated farms surrounded by urban development. In such cases, the continuation of farming is often impossible. When preservation programs purchase easements immediately adjacent to an urban growth area, they effectively limit the contiguous expansion of the town. Municipal officials designate growth boundaries to encompass land that can accommodate growth for twenty years. After twenty years, the location of an urban growth boundary is reevaluated to provide for further growth. By

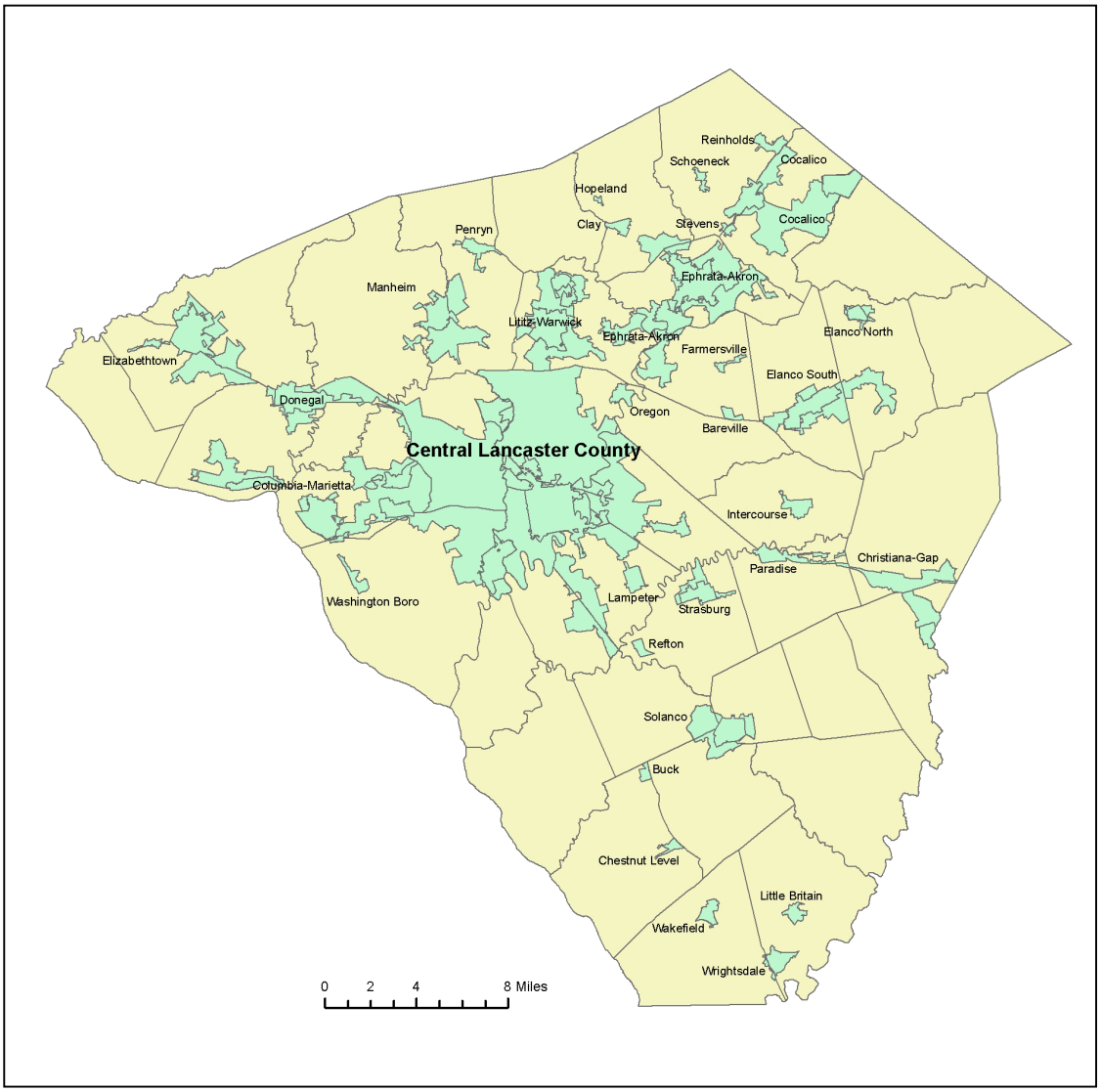


Figure 5.8. Urban and Village Growth Areas. Source: Lancaster County GIS Department.

preserving farms close to urban growth areas, preservationists encourage leapfrog development, especially since extensions of public water and sewer lines may pass through preserved farms. Some residents are concerned that current zoning ordinances do not allow for densities high enough to effectively control sprawl beyond the growth areas (Nichols 2003, 15).

Conflicts arise when road expansions condemn prime farmland. Lancaster citizens love their farmland, but they also want to be able to drive free from congested traffic. Lengthy traffic jams afflict U.S. Highway 30 and State Route 23 during the tourist season. Despite public input on widening Route 23, the Pennsylvania Department of Transportation favors a route that will condemn farmland and open the area along it to urban growth and development. Preserved farmland also limits traffic congestion in areas of the county where agriculture is not a tourist draw. The answer to a balance between free-flowing roadways and farmland lies in land use planning.

A recent report by the Brookings Institution gives voice to a problem long perceived across the Commonwealth. Concerted government action and coordination are seriously inhibited by the fragmented nature of municipal government (Rusk, 2003, 2). Lancaster County has sixty municipalities. The difficulties are revealed in the uneven use of urban and village growth areas, comprehensive planning, subdivision regulations, and zoning ordinances across the county. Inevitably, they come to bear on the county's ability to preserve farmland.

Farmland Preservation by Default: The Old Order Amish

Given the general acceptance of the conservation easement purchase program, it is ironic that a large group of Lancaster's best-known farmers refuse to participate in governmentally-funded farmland preservation. The majority of the Old Order Amish do not accept government payments, including easement purchases (Kraybill 2001, 279). Alarm grows with the increase in numbers of Old Order Amish who no longer farm for a variety of reasons (Nichols 2003, 15). Many of the non-Amish in Lancaster County assume that Amish farmland does not need official preservation because an Amish person would not sell his or her land for development. Even John Fraser Hart is unaware of the situation. In *The Land that Feeds Us,* Hart asserts that "perhaps the best way to preserve land for agriculture is to sell it to an Amishman because you know he will never sell it" (1991, 34). For better or worse, Lancaster County has faced unprecedented change in recent years. The solidity of farming as the proper occupation for an Amish person has begun to crumble (Phillips 1996, 18; Useem 1996, 80; *Wave Goodbye* ... 1989).

Amish societies have strong cultural ties to farming, an activity that not only provides a religiously-approved livelihood but also serves as an organizational base for family structure. Through the mandates of their faith, personal choice, and cultural preference, the Amish forego many trappings of modern life. But the belief that Amish cannot be separated from their land is a myth (Schellenger July 1, 2003; Walbert 2002, 187). Matthew Knepper of the Lancaster County Agriculture Preserve Board and Heidi Schellenger of the Lancaster Farmland Trust related several instances in which the Old Order Amish had sold their farms (Knepper July 14, 2003; Schellenger July 1, 2003). All farmers in Lancaster County, Plain and English, are faced with the implications of a tight

land market. The size of the county's Plain population increased tenfold during the 1900s (Walbert 2002, 187). Most Amish families would like to see their sons own their own farms, but land is in short supply. Prices for high-quality farmland now hover at $10,000 per acre.

For the Plain population, social and economic circumstances have pushed many out of agriculture. Not willing to cut family ties and leave for areas with cheaper land, many of the Plain people have started construction and other types of wood-working businesses. They farm primarily for subsistence (Nichols 2003, 15; Walbert 2002, 187). These occupations allow the Plain peoples to provide for themselves while following the strictures of their faith. Without a daily connection to farm life, many Plain people are becoming urbanites, complete with expensive urban homes.

This important shift in Amish culture has been studied in detail (Kraybill 2001; Hostetler 1993). In relation to farmland preservation, the shift is further evidence that the Plain people should not be looked to as a guarantee for the continuance of farming in Lancaster County. In at least one respect, Lancaster County officials are not taking this view. The Lancaster Farmland Trust is a private organization that preserves farmland through the purchase of conservation easements. The trust is funded entirely through private donations from individuals and corporations. Because no government funds are used, Plain people accept easement purchase payments from the Lancaster Farmland Trust.

Plain people, generally, do not take part in the political process. Voting for representatives who support farmland preservation, petitioning township supervisors and county commissioners, taking legal action, and protesting development are beyond the

realm of actions many Plain people are willing to take. Similarly, seeking an organization to preserve a farm is a path that most Plain people do not follow. The Lancaster Farmland Trust focuses on Amish properties in key locations and properties contiguous to preserved ones. The Trust relies heavily upon word-of-mouth within the Amish community. Progress has been made, but building trust between the Amish and the Lancaster Farmland Trust is in its early stages. The Lancaster Farmland Trust can also act quickly on key properties that might not be preserved by the county easement purchase program.

Measuring Program Effectiveness

What are Lancaster County's farmland preservation goals? The Agriculture Preserve Board's mission statement reads, "To forever preserve the beautiful farmland and productive soils of Lancaster County and its rich agricultural heritage; and to create a healthy environment for the long-term sustainability of the agricultural economy and farming as a way of life" (2001, 1). Tom Daniels, a nationally recognized expert on farmland protection and past director of Lancaster County's preservation effort, believes that farmland preservation programs should be judged in five areas:

> (1) the protection of a critical mass of land; that is, a sufficient base of farmland to enable support businesses to survive; (2) the maintenance of affordable land prices for farm expansion and the entry of new (young) farmers; (3) a reliable, long-term protection program; (4) cost-effectiveness—protection must come at a reasonable cost relative to its benefits; and (5) sustained social and political capital through the support of the general public and elected officials (1998, 3).

By protecting approximately 50,000 acres of farmland, Lancaster County has preserved a critical mass of farmland. Farm support services are alive and well within the county. Land prices are high due to competition among farmers, not as a result of the

preservation program. Lancaster County's preservation program is the oldest in the state, is strongly supported by its citizens, and is financially stable. No study has determined whether the county's program is cost effective. However, since preserved farmland promotes both the agriculture and tourism industries, cost-effectiveness is greater than in most other locales. Sustained social and political capital is apparent. Support for farmland preservation is extremely high. Seventy-five percent of Lancaster residents find loss of farmland a serious problem, and ninety percent feel the loss of farmland should be stopped or slowed (Quality of Life Survey 2002, 2). Elected officials are aware of farmland preservation's popularity and support it (Mundy July 10, 2003).

Daniels identifies three shortcomings in Lancaster County's preservation effort. Only a few landowners receive monetary benefits because funding is limited. Easement payments benefit current landowners, while in the future landowners may be subject to deed restrictions without financial recompense. Daniels also believes that a lack of property tax relief for farms with easements is another weakness. While farmers may apply for use assessment under the "Clean and Green" program, property tax rates continue to rise. Finally, Daniels identifies the voluntary nature of the program as a vulnerability. While plenty of farmers volunteer land for easement purchase, key properties may be lost because their owners do not want easements (1998, 11).

Support for farmland preservation is strong in Lancaster County because disparate groups of citizens believe that preservation is beneficial. Mona Nichols finds that:

> Farmers and farm-related business owners want to maintain their livelihood; the Plain Sect population wants to maintain its autonomy and tradition; older generations seek to save the county from the headaches of traffic and congestion

> that plague other areas nearby; newly arrived citizens attempt to maintain the pastoral charm of the countryside (2003, 16).

Lancaster is one of a few counties whose name conjures up definitive images in the minds of people across the nation. The images include orderly farms and silhouettes of horses and buggies. Lancaster's citizens aim to preserve their agricultural heritage and ensure the existence of agricultural landscapes. This attitude indicates that the concern in Lancaster County goes deeper than a suburbanite's desire for an aesthetically pleasing hobby farm nearby. Preserving farmland as a robust economic activity creates numerous inconveniences. Achieving the goal means mud, dust, the smell of animal waste, tractor noise, and roads clogged with farm equipment. Apprehensions are growing as farmers increasingly look to large concentrated feeding operations to achieve economies of scale and bolster profit margins (Schellenger, July 1, 2003; Knepper, July 14, 2003).

Farmland preservation has resulted in a highly developed county-level legal structure. But is the structure effective? I believe the answer is yes, particularly in townships where twenty to forty percent of the land is permanently preserved. In other areas, conservation easements confine urban expansion along certain public thoroughfares and direct the growth of municipalities in specific directions. East of the city of Lancaster, religious stricture has the same effect as a conservation easement purchase program. However, the Amish population in the county is increasingly less involved in farming. If more conservation easements are to be purchased in Lancaster County, the Amish areas need them.

The ultimate measure of any agriculture preservation program's effectiveness is its effect upon the landscape. Conservation easements, Agricultural Security Areas,

agricultural zoning, and comprehensive planning efforts in Lancaster County are slowing change. Whether or not land and heritage will remain preserved is impossible to know.

CHAPTER SIX

Conclusions

The concept of farmland preservation through conservation easement purchases originated and grew to maturity along the northeastern seaboard. Southeastern Pennsylvania, with its high degree of urban development and its prosperous farm economy, has been a focal point for preservation using conservation easements for several decades. Despite the emphasis on the southeastern urban core of the state, other areas across the Commonwealth show increasing interest in safeguarding farmland from conversion to urban uses.

This study investigates the dynamics and distribution of a particular method of farmland preservation, the purchase of agricultural conservation easements. It describes the development of policies and laws at federal and state levels that affect farmland preservation. The legal instruments are placed into a context of American ideals concerning property rights and the family farm. As landscapes change from rural to urban, attitudes change from "don't tell me what to do with my land" to "don't do that with your land." The study describes the complex legislative and regulatory structure in Pennsylvania for preserving farmland with conservation easements. Pennsylvania's nationally recognized Purchase of Agricultural Conservation Easement program is the result of a hundred years' experience with land conversion issues. Pennsylvania citizens support the program through political action and are responsible for the progress it has made.

The study confirms that areas with highly active county conservation easement purchase programs are ones where urban development pressure and prosperous farmland coexist uneasily. In Pennsylvania, suburban counties in the southeastern corner of the state and in the Great Valley of Appalachia often spend more local tax revenue on easement purchases than the amounts of their state grants. In contrast, counties with little economic growth, few farms, or lack of local support have limited participation in the conservation easement purchase program. Counties across the state fit this description, but the strongest examples are in the Pittsburgh area. Lack of farmland preservation around Pittsburgh is due primarily to voters refusing to fund programs with local dollars. For this reason, the counties do not receive matching state grants. While the purchase of conservation easements is increasing in the Pittsburgh area, limited agriculture and economic growth provide few opportunities for them. Other areas in Pennsylvania inactive in the state conservation easement purchase program also have slow economic growth or very few farms. The northern tier of counties, where much of land is in state or national forests, is the largest area of preservation inactivity.

Lancaster County was an early leader in the movement to preserve farms and continues to serve the nation as a model. In Lancaster County, one of the most important factors in preserved farmland is not related to urban expansion or to conservation easement purchase programs, but rather to lifestyle and religious issues. Because the Amish refuse to participate in government programs, publicly funded conservation easements are not an option for much of Lancaster County's farmland. Many would argue that Amish ownership equates with preservation, albeit not a public variety. But the idea that Amish ownership preserves farmland is fading as many Amish leave farms

for other parts of the country or urban-related jobs. Lancaster County utilizes other methods for farmland preservation, including agricultural zoning, agricultural security areas, comprehensive planning, and private land trusts, to provide a complete, effective preservation program.

Pennsylvanians are protective of their farmland, in part, because much of the Commonwealth's cultural and economic history is bound to agriculture. Productive soils and large urban markets have resulted in a strong agricultural economy with proponents and lobbyists influencing legislators. Also, economic analysis lends favor to the idea that strengthening and diversifying the local economy by buying local is a wise way to promote economic growth. Produce raised in Lancaster County is advertised as far away as the Reading Terminal Market in downtown Philadelphia (Figure 6.1). Lancaster County's name has national brand appeal that is further enhanced if the produce is grown by Amish and Mennonite families.

Part of the explanation of the distribution of conservation easements lies in the geology and geography of the Commonwealth. The limestone valleys of the Ridge and Valley province are historic population centers and continue to be popular locations for new development. Some of the valleys are quite large and carpeted with prosperous farms. Satellite colonies of Amish and Mennonite farmers own many of the farms. The widely dispersed valleys raise local awareness of farmland protection issues.

To characterize Pennsylvania's heritage as solely agrarian is misleading. Vast areas in the northern and western sections of the Commonwealth were shaped by industrial economies and economies based on the extraction of timber and coal.



Figure 6.1. Advertisement of Lancaster Produce in Reading Terminal Market, Downtown Philadelphia. Photo by author, 2003.

Pennsylvanians who live in areas of the state with virtually no current or historical ties to agriculture do not support preservation at the high levels found in the southeastern counties. Whereas nearly everyone in Lancaster County supports farmland preservation, few in the northern tier of counties would vote to raise local taxes to fund preservation. Most communities fighting for economic prosperity throughout rural Pennsylvania do not favor agricultural land preservation over economic development. Farmland has no application to their daily lives. Farm numbers decline because farmers can no longer make a profit on marginal lands that lie far from urban markets. Fortunately for the state's conservation easement purchase program, southeastern counties hold a majority of the state's population and wield considerable political power.

By banding together and entrusting their tax dollars to a complicated bureaucracy, Pennsylvania's citizens have overcome fragmentation and inaction at the municipal level and mobilized resources. I believe citizens will support farmland preservation as long as agriculture and urbanization continue to rub elbows in the southeast. I also believe Pennsylvanians will increasingly look to growth management principles, inner city revitalization efforts, and innovative economic growth ideas to further enhance the livability of the Commonwealth.

Farmland preservation will continue to be an item on Pennsylvania's political agenda, and methods will continue to evolve. The biggest difficulty in assessing effects of conservation easements is the short time that they have existed. Few have been in place more than fifteen years. In ten years, the earliest conservation easements will reach the date when owners may repurchase them if the land is no longer agriculturally viable. If land remains in agriculture, a permanently locked land use may have unintended

effects. Already, negative effects of the conservation easement purchase program can be seen in housing markets and development patterns in Lancaster County, where preserved farmland contributes to rising housing costs.

The most important need for further research is the effect that preserved farmland has on surrounding landscapes. While numerous articles and books examine agriculture on the rural-urban fringe, public support, and various methods for land preservation, few studies examine the resultant landscape. Early research shows that preserved land has effects ranging from local to national scales. If conservation easements are a cure for urban sprawl, we must investigate their effectiveness and their consequences.

The rapidly urbanizing Great Valley, which extends southward from Pennsylvania into Maryland, West Virginia, Virginia and Tennesseee, needs geographic study. Despite decline of agriculture, the valley has productive pockets of dairy and orchard farms. Tendrils of growth connected to Philadelphia and Washington combine with expanding small metropolitan areas in the valley. Pennsylvania's next big fight to preserve agricultural land will occur in the Great Valley. Although the soils are excellent, their expanses are smaller and farmland is fragmented. Most municipalities in the valley have limited experience with growth management. Regardless of the outcome, this struggle should be documented.

Further research should analyze the role of agriculture in Pennsylvania's counties remote from metropolitan areas. Some nonmetropolitan counties have good soils, strong historic ties to agriculture, and little urban development pressure, but still face decline of agriculture. Nonmetropolitan counties often do not have the tax base, the social capital, or the political motivation to preserve farms. Pennsylvania's conservation easement

purchase program is most active on the rural-urban fringe, because that is where urban development and agricultural land uses are in conflict. As rural-urban fringes continue to expand and threaten more farmland, greater funding should be directed toward preservation of farms in Pennsylvania and the nation.

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APPENDIX

APPENDIX A

Variables Used in Initial Correlation Matrix

Urban Fringe and Development Measures

Pop1	*percent change in population, 1990-2000*
Pop2	*population density, people per square mile*
Pop3	*percent of municipalities with a population greater than 10,000 people*
Pop4	*percent of municipalities with a population of 5,000-9,999 people*
Pop5	*percent of municipalities with a population of 2,500-4,999 people*
Pop6	*percent of municipalities with a population of 1,000-2,499 people*
Pop7	*percent of municipalities with a population of 500-999 people*
Pop8	*percent of municipalities with a population less than 500 people*
Pop9	*percent of population classified as urban*
Pop10	*percent of population classified as rural*
Pop11	*farm population as a percent of total rural population*
Pop12	*ratio of non-farm residents to farm residents*
House1	*new housing units built per square mile, 1992-2002*
House2	*percent of new units—single family homes*
House3	*percent of new units—duplexes and apartments*
Landval1	*value of agricultural land and buildings in 1997, dollars per acre*
Preser4	*average purchase price of agricultural easements in 2001, dollars per acre*
Educ1	*percent of population without a high school diploma, 2000*
Educ2	*percent of population with high school degree or equivalent, 2000*
Educ3	*percent of population with some college or associates degree, 2000*
Educ4	*percent of population with bachelors degree or higher, 2000*
Income1	*median household income, 2001*
Income2	*change in median household income, 1989-1999*
Income3	*average household income, 2001*
Income4	*percent of households earning more than $50,000 per year in 2000*
Income5	*per capita income, 2001*
Income6	*change in per capita income, 1991-2001*
Income7	*percent of population living below poverty level*
Sector1	*percent of workforce employed in manufacturing, 1997*
Sector2	*percent of workforce employed in wholesale and retail trade, 1997*
Sector3	*percent of workforce employed in mining, utilities, construction, and transportation, 1997*
Sector4	*percent of workforce employed in information, finance, insurance, and real estate, 1997*
Sector5	percent of workforce employed in educational, profession, scientific, and technical services, 1997
Sector6	*perc ent of workforce employed in healthcare and social assistance, 1997*
Sector7	*percent of workforce employed in other sectors, 1997*
Collar1	*percent of workforce employed in professional and management jobs, 1997*
Collar2	*percent of workforce employed in white collar jobs, 1997*
Collar3	*percent of workforce employed in services, 1997*
Collar4	*percent of workforce employed in blue collar jobs, 1997*

Plan1	*percent of municipalities with planning commissions, 2000*
Plan2	*percent of municipalities with comprehensive plans, 2000*
Plan3	*percent of municipalities with zoning regulations*
Plan4	*percent of municipalities with subdivision regulations*
Mobile1	*percent of population that did not move between 1995 and 2000*
Mobile2	*percent of population that did move between 1995 and 2000*
Commute1	*percent of workforce employed within their county of residence*
Commute2	*percent of workforce employed outside their county of residence*

Agricultural Viability and Location Measures

Size1	*percent of farms under 50 acres, 1997*
Size2	*percent of farms with 50-179 acres, 1997*
Size3	*percent of farms with 180-499 acres, 1997*
Size4	*percent of farms with over 500 acres, 1997*
Mkvalue1	*average market value of goods and produce sold in 1997, dollars per farm*
Mkvalue2	*average market value of goods and produce sold in 1997, dollars per acre*
Mkvalue3	*ratio of county value per acre to state value per acre, 1997*
Mkvalue4	*ratio of county value per farm to state value per farm, 1997*
Mkvalue5	*average value of goods as percent of state total value, 1997*
Mkvalue6	*percent of market value from crops, 1997*
Mkvalue7	*percent of market value from livestock, 1997*
Operat1	*percent of farmers who worked off-farm for more than 200 days, 1997*
Operat2	*percent of population who are farmers, 1997*
Operat3	*percent of farmers whose principal occupation is farming, 1997*
Operat4	*percent of farmers whose principal occupation is not farming, 1997*
Sales1	*percent of farms selling less than $10,000 annually, 1997*
Sales2	*percent of farms selling $10,000-49,999 annually, 1997*
Sales3	*percent of farms selling more than $50,000 annually, 1997*
Sales4	*percent of farms selling greater than $50,000 annually, 1997*
Sales5	*percent of statewide farms selling more than $50,000 annually, 1997*
Sales6	*percent of farms selling less than $50,000 annually, 1997*
Sales7	*percent of statewide farms selling less than $50,000 annually, 1997*
Acreage1	*percent of farmland lost, 1969-1997*
Acreage2	*percent of state total number of farms, 1997*
Acreage3	*percent of land area in farms, 1997*
Acreage4	*percent of farm acreage in crops*
Acreage5	*percent of farm acreage in orchards*
Acreage6	*percent of total acreage in orchards*
Acreage7	*percent of state total of orchard acres*
Dairy1	*percent of state total number of dairy cows*

Other Measures

Vote1	*percent of population registered to vote, 2000*
Vote2	*average voter turnout, 1996-2002*
Vote3	*percent of voters registered as Democrat, 2000*
Vote4	*percent of voters registered as Republican, 2000*
Vote5	*percent of voters registered as Libertarian, Independent, or Other, 2000*
Tax1	*per capita local taxes collected*
Tourism1	domestic travel expenditures in 2000, dollars per capita

VITA

Amy Hill was born and raised in Needmore, Pennsylvania. Her father Willard manages several State Game Lands for the Pennsylvania Game Commission. Her mother Susan does sales and accounting for a Napa Auto Parts franchise owned by the author's uncle. Amy is an only child. She lived near Needmore for eighteen years and enjoyed a childhood that centered on family, farming, community, school, and the outdoors. In 1997, she left rural Fulton County and moved to the Cumberland Valley to attend Shippensburg University. There, she majored in geoenvironmental science and history and became interested in the dynamics of land use conversion.

After graduating from Shippensburg University in May of 2001, Amy accepted a graduate assistantship in the Geography department at the University of Tennessee-Knoxville. For the past five years, she has explored aspects of both rural and urban geography while sharpening her focus on the rural-urban frontier. In June of 2004, Amy accepted a position as a community planner with the State of Tennessee's Local Planning Assistance Office. In addition to conducting continuing research on the topic of farmland preservation, Amy served as the staff planner to six East Tennessee towns. Amy will be returning to Pennsylvania shortly to begin employment with the York County Planning Commission.