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Partial Interests in Land: Policy Tools for Resource Use and Conservation.

By Keith Wiebe and Abebayehu Tegene, Natural Resources and Environment Division, and Betsey Kuhn, Food and Consumer Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 744.

Abstract

Property rights arise out of law, custom, and the operation of private markets, with important implications for how land and other natural resources are used and conserved. Over the past several years, debate about the nature and scope of property rights has combined with budget concerns and reauthorization of the Farm Bill, the Clean Water Act, and the Endangered Species Act to focus public attention on Federal natural resource policy. This report examines the nature of land ownership and the evolving Federal role in land use and conservation, with particular attention to the voluntary acquisition and conveyance of conservation easements and other partial interests in land.

Keywords: property rights, partial interests, land use, conservation easements

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Contents

Summary.....	iii
Introduction.....	1
Partial Interests in Land.....	2
Property and Ownership.....	2
Partial Interests.....	2
Policy Tools for Resource Use and Conservation.....	4
The Federal Role in Partial Interests as Policy Tools.....	7
Partial Interests in Three Policy Settings.....	8
Farmland Protection.....	10
The Conservation Reserve Program.....	14
The Wetlands Reserve Program.....	19
Markets for Partial Interests in Land.....	24
Participants.....	24
Transactions.....	27
Partnerships.....	29
Mitigation Banking.....	31
Valuation of Partial Interests in Land.....	33
Fair Market Value.....	33
After-Tax Value.....	40
Social Value.....	41
Case Studies Revisited.....	42
Lessons for Resource Use and Conservation Policy.....	44
References.....	45
Appendix.....	52
Index.....	53

Summary

The nature and distribution of property rights are fundamental to the health of the Nation's economy and environment. These rights arise out of law, custom, and the operation of private markets, with important implications for how land and other natural resources are used and conserved. Over the past several years, debate about property rights, combined with budget concerns and reauthorization of the Farm Bill and other environmental legislation, has focused public attention on Federal natural resource policy. This report examines the evolving Federal role in land use and conservation policy, with particular attention to "partial interests" in land.

Partial interests in land include conservation easements, mineral rights, farmland rental agreements, and other elements of land ownership. Partial interests in a particular tract of land can be held and traded separately, presenting opportunities for public agencies to influence resource use without incurring the political costs of regulation or the full financial costs of outright land acquisition.

Throughout U.S. history, public agencies have used partial interests as policy tools to influence the use of public and private land in ways that accomplish public objectives. Current examples of partial interests used in this way include Conservation Reserve Program (CRP) contracts, Wetlands Reserve Program (WRP) easements, and farmland protection easements acquired by State and local governments (see summary table). In each case, government agencies acquire partial interests on a voluntary basis from private landowners. The importance of partial interests as policy tools was recently reaffirmed by the 1996 Federal Agriculture Improvement and Reform Act, which, in addition to reauthorizing the CRP and the WRP, established a new Farmland Protection Program that increases the Federal role in the acquisition of farmland protection easements.

Partial interests can be acquired and conveyed in many different ways to accomplish a variety of resource use and conservation objectives on both public and private land. Public and private programs differ in the ways in which they acquire partial interests, and also in the participants they attract. While public programs generally pay market value for conservation easements, for example, private programs generally seek donations or bargain sales. The former attract many offers but have relatively high acquisition costs and limited funds; the latter have lower acquisition costs but tend to appeal primarily to wealthier or more conservation-minded donors. Thus, the two types of programs are complementary.

To succeed as resource policy tools, partial interests must be tailored to meet specific program and landowner goals on specific parcels of land, and can thus involve substantial costs in negotiation and settlement. They also require ongoing monitoring and enforcement. These costs may offset savings relative to the political costs of regulation or the full financial costs of outright land acquisition.

To reduce the costs of using partial interests as policy tools, Federal, State, and local government agencies may in some cases find it beneficial to work in partnership with nonprofit organizations that are themselves involved in acquiring and conveying partial interests for conservation purposes.

The value of a particular partial interest is typically estimated as the difference between the value of the underlying land with and without the interest in question. Experience with the valuation of partial interests thus sheds light on recent legislative proposals regarding property rights. These proposals would require compensation whenever Federal agency actions diminish the value of a portion of a property more than a specified percentage, regardless of other economic and legal criteria. Compensation would be determined as the difference between the value of a property with and without the agency action in question. Experience with partial interests suggests that determination of compensation levels under such proposals would require careful case-by-case analysis. Such issues will likely play a central role in the ongoing debate over reauthorization of the Clean Water Act and the Endangered Species Act.

Summary table—Participation in selected easement and easement-like programs, 1995

Region ²	State and local farmland protection programs		Conservation Reserve Program		Wetlands Reserve Program (including emergency signups) ¹	
	<i>Acres</i>	<i>\$/acre</i>	<i>Acres</i>	<i>\$/acre/year</i>	<i>Acres</i>	<i>\$/acre</i>
Appalachia	1,255	1,422	1,158,124	54	18,514	n.a.
Corn Belt	0	—	5,603,333	74	115,621	n.a.
Delta States	0	—	1,248,403	44	148,667	n.a.
Lake States	0	—	3,008,337	59	18,664	n.a.
Mountain	1,904	1,709	6,687,264	40	3,410	n.a.
Northeast	337,092	1,666	226,411	59	6,383	n.a.
Northern Plains	0	—	9,664,110	46	25,254	n.a.
Pacific	56,435	1,725	1,791,182	50	27,910	n.a.
Southeast	0	—	1,692,580	43	5,257	n.a.
Southern Plains	0	—	5,342,989	40	21,798	n.a.
Total ³	396,686	1,674	36,422,733	50	391,478	600

-- = not applicable. n.a. = not available.

¹As of August 1996.

²Appalachia = KT, NC, TN, VA, WV; Corn Belt = IL, IN, IA, MO, OH; Delta States = AR, LA, MS; Lake States = MI, MN, WI; Mountain = AZ, CO, ID, MT, NV, NM, UT, WY; Northeast = CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT; Northern Plains = KS, NE, ND, SD; Pacific = CA, OR, WA; Southeast = AL, FL, GA, SC; Southern Plains = OK, TX.

³Excludes Alaska and Hawaii.

Partial Interests in Land

Policy Tools for Resource Use and Conservation

Keith Wiebe
Ababayehu Tegene
Betsey Kuhn

Introduction

The nature and distribution of property rights are fundamental to the health of the Nation's economy and environment. These rights arise out of law, custom, and the operation of private markets, with important implications for how land and other natural resources are used and conserved. Over the past several years, debate about the nature and scope of property rights has combined with budget concerns and reauthorization of the Farm Bill, the Clean Water Act, and the Endangered Species Act to focus public attention on Federal natural resource policy. To help policymakers and the public better understand some of the economic dimensions of this debate, this report examines the nature of land ownership and the evolving Federal role in land use and conservation, with particular attention to the voluntary acquisition and conveyance of partial interests in land.

Partial interests are the constituent elements of land ownership, including rights to use and profit from land. From an economic perspective, interests in land represent expectations about which land uses will be legally permissible over time, as well as expectations about the returns that those uses will generate. Partial interests in a particular tract of land can be held and traded separately, presenting opportunities for public agencies to influence resource use without incurring the political costs of regulation or the full financial costs of outright land acquisition.

The ways in which land is used depend on who holds what interests within the complex bundle of rights that constitutes land ownership. The public and its representatives, including the U.S. Government, have long played a dual role in shaping the distribution of these rights. First, through legislation, regulation, and court decisions, public agencies help establish and define the distribution of property rights within which markets function. And second, public agencies participate in the resulting markets (for example by buying and selling land and interests in land).

Throughout U.S. history, public agencies have used both of these roles to influence public and private land use in ways that accomplish public objectives. For example, Federal land grants to States, railroad companies, and individual homesteaders encouraged westward expansion in the 19th century. These grants were generally conditioned on the land being cleared, drained, plowed, or otherwise made suitable for productive use. With the closing of the frontier and subsequent land use intensification, public agencies in the 20th century have shifted gradually toward balancing resource use and conservation, both on private lands and on lands that remain in public ownership.

This shift does not represent a growing Federal preference for regulation over market participation (although it has been characterized as such by some) so much as a change in the nature of the public objectives that have always been supported by Federal incentives for private action. Whereas public objectives were served in the 19th century by expanding settlement and production, increased levels of economic activity and a growing population have combined in the 20th century to heighten public concerns about environmental protection and resource conservation.

Federal efforts to meet these concerns have relied on a broad range of policy tools, including both direct and indirect voluntary mechanisms (such as commodity programs, conservation programs, and tax incentives) as well as regulatory means (such as wetland regulations). The continuing importance of partial interests as policy tools is evident in the Federal Agriculture Improvement and Reform Act (the 1996 Farm Bill). In addition to restructuring Federal payments to farmers, the 1996 Farm Bill reauthorized the Conservation Reserve Program and the Wetlands Reserve Program and established a new Farmland Protection Program. This report examines these and other resource policy mechanisms, each of which involves the voluntary acquisition or conveyance of partial interests in land.

Partial Interests in Land

Land ownership is sometimes considered to imply the right to do whatever a landowner wishes with his or her land. Much of the popular debate about property rights appears to be based on this supposition. In fact, the reality of land ownership is considerably more complicated.

Land ownership consists of a “bundle of rights,” not all of which are necessarily held by the landowner. The uses that a landowner may make of his or her land depend on who holds what rights within the bundle that constitutes ownership. The public and its representatives, including the U.S. Government, have long made use of this fact to influence public and private land use in ways that accomplish public objectives. To understand how this influence is exercised, we need to consider what is meant by property and ownership.

Property and Ownership

Property and ownership are legal concepts rooted in social institutions. They refer not simply to material objects but to the relations between individuals and society that govern access to material objects. “The legal concept of property does not denote the tangible or intangible objects that are termed property in common speech. Rather, property as a legal concept refers to rights and interests in such objects” (Youngman, 1993).¹

Real property refers specifically to interests in land, such as rights to draw water, graze livestock, grow crops, or build houses. As Coase writes,

We may speak of a person owning land and using it as a factor of production but what the land-owner in fact possesses is the right to carry out a circumscribed list of actions. The rights of a land-owner are not unlimited... [For example,] it may or may not be possible to erect certain types of buildings or to grow certain crops or to use particular drainage systems on the land. This does not come about simply because of Government regulation. It would be equally true under the common law. A system in which the rights of the individual

were unlimited would be one in which there were no rights to acquire (1960: 137).

In this report, we consider these legally defined rights and interests in land from an economic perspective. Seen from such a perspective, interests in land represent expectations about what uses will be legally permissible over time, as well as expectations about the returns that those uses will generate. Returns may be derived from farming, development, extraction of mineral resources, as well as recreation and a variety of other uses. Land values reflect these alternative current and potential uses, and will change over time as expected returns to these uses change. For example, figure 1 illustrates the volatility of U.S. farm real estate values between 1910 and 1995, rising dramatically in the 1970’s and fluctuating by 10 percent or more in many years.

The importance of considering legally defined interests from an economic perspective becomes critical in the context of the current debate over private property rights. Legislation being considered by Congress requires that private property owners be compensated not only when a legally defined interest is taken from them, but whenever government actions diminish property values. Because such values incorporate expectations not only about permissible uses but also about potentially volatile returns to those uses over time, interests in land require careful economic as well as legal consideration. (See the section “Valuation of Partial Interests in Land” for more detail.)

Partial Interests

There are typically many partial interests in even a single parcel of land, including rights to produce commodities, graze livestock, extract minerals, dispose of waste materials, and develop the land. Interests may arise from custom or tradition, they may be defined by government regulation, as in the case of zoning, or they may be negotiated between private parties, as in the case of lease agreements. Interests may be specified for a finite period, they may be open-ended, or they may run in perpetuity.

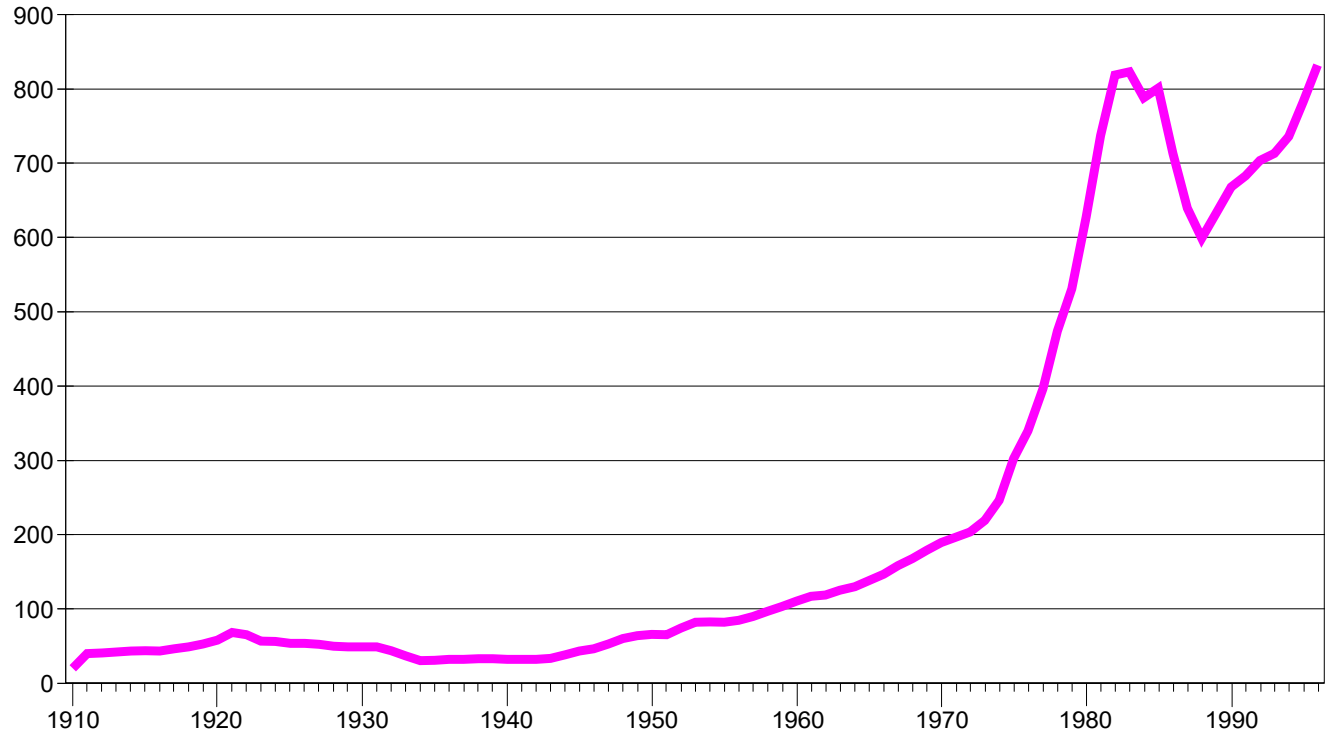
The bundle of rights and responsibilities that comprise land ownership may remain intact, as when a landowner retains all partial interests, or they may be allocated among multiple parties, both public and private. For example, a farmland owner may rent land to a farm operator. The farm operator then holds the

¹Names in parentheses refer to sources listed in the References at the end of this report.

Figure 1

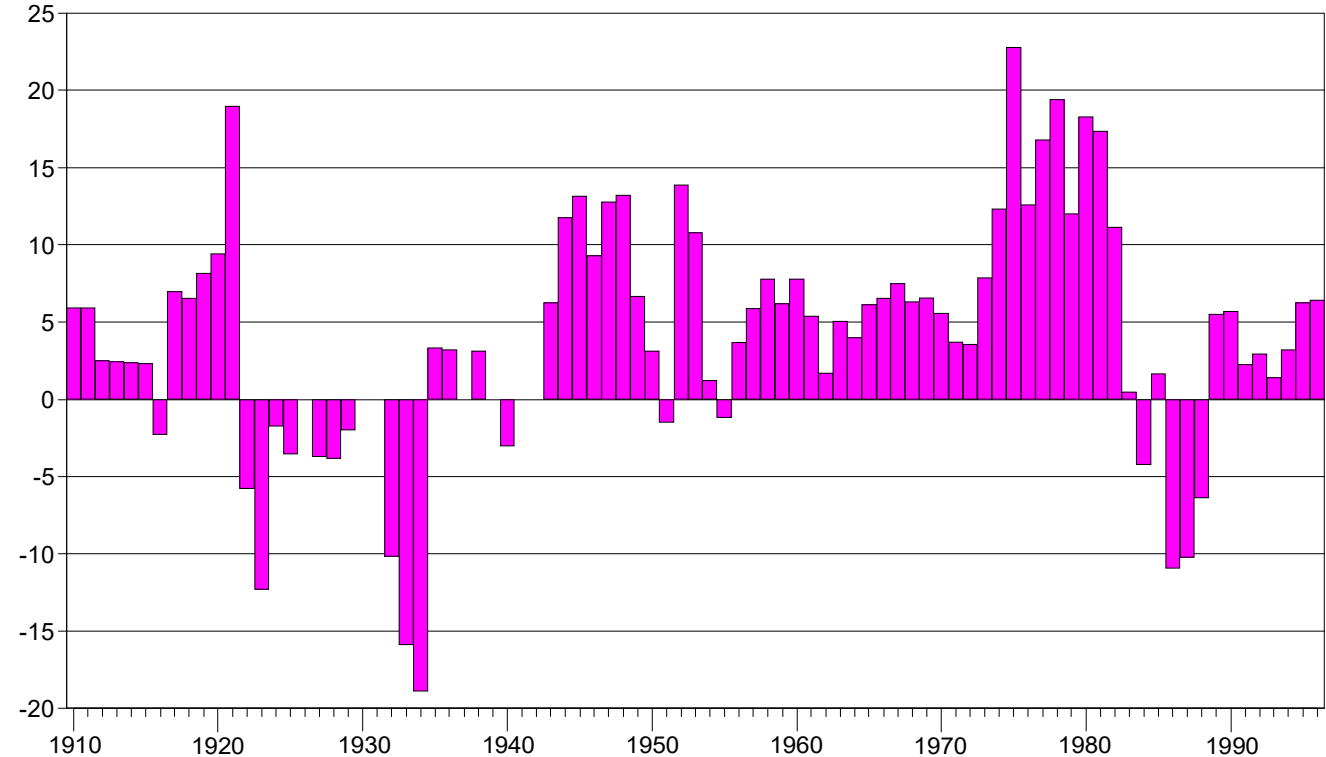
Average nominal value per acre of farm real estate in the U.S., 1910-95

Dollars



Percent change in average nominal value per acre of farm real estate in the U.S., 1910-95

Percent change



Source: Economic Research Service.

right to use the land for agricultural production for a specified period, while the farmland owner retains the underlying title and the right to use the land as he or she chooses in subsequent periods. The same farmland owner may sell drilling rights on the same parcel of land to an energy company, which then holds rights to extract oil and natural gas. These are fairly straightforward examples. Other interests in land are less well understood, but are becoming increasingly important. If a parcel of undeveloped land has potential for conversion to residential, commercial, or industrial use, the owner holds “development rights” that may be highly valued by developers, government agencies, and conservation organizations. (“Development rights” will be discussed in greater detail in the following sections.)

Even on privately owned land for which no interests have been rented out or sold, a single owner does not hold all interests. To protect the interests of other members of society, various levels of government generally reserve the rights of taxation, eminent domain (the right to acquire private property for public purposes, with compensation), police power (the right to prevent actions that harm others), and escheat (the right to take possession of land left by a person who dies without heirs) (Renne, 1993; Closser, 1993).

Likewise, private citizens or corporations may hold certain interests in publicly owned land, such as rights of way, oil and gas leases, and mineral leases (Laitos and Westfall, 1987). The distribution of interests across multiple holders thus blurs the conventional distinction between what we think of as “public” and “private” land.

In sum, landownership consists of multiple interests that are generally held by more than one agent. Land use decisions depend on how these partial interests in land are distributed among public and private individuals and agencies.

Policy Tools for Resource Use and Conservation

Partial interests shape the use of private and public land in the United States. This section introduces three forms of partial interests in land. The first, private interests in public land, typically allow specified resource uses for public and private benefit. The second, conservation easements, represent the use of partial interests in land to encourage the conservation or

preservation of privately owned land for public benefit. Conservation easements are typically long term (for example, 30-year) or perpetual interests in private land that are acquired by government agencies or non-profit organizations. While they are, in a sense, mirror images of one another, both cases represent an effort to balance public and private objectives in resource use and conservation. The third form of partial interests in land, options, are primarily a means of conveying other interests in land, but they can also be used to restrict land use over short periods of time.

Private Interests in Public Land

The Federal Government once held most of the present area of the United States. Millions of acres have since been transferred to private ownership through grants and sale to individuals and corporations (U.S. Dept. of the Interior, Bureau of Land Management, 1994). Even on land remaining in Federal ownership, private individuals and corporations today hold a variety of partial interests, including rights of way, mineral leases, and oil and gas leases (Laitos and Westfall, 1987). By contrast, grazing permits and livestock-use permits are revocable licenses and “convey no right, title, or interest held by the United States in any lands or resources” (U.S. Dept. of Agriculture, Forest Service, 1991). Privately held partial interests in public land are introduced here by way of contrast, but the remainder of this paper focuses on partial interests in private land.

Conservation Easements

Like privately held mineral leases on Federal land, conservation easements are partial interests in land, but the two types of partial interests differ in many ways. While mineral leases represent the acquisition of partial interests in public land by private individuals to allow resource use, conservation easements represent the acquisition of partial interests in private land by government agencies and nonprofit organizations for conservation purposes.

Easements have been recognized as legitimate interests in land for centuries. “An easement is a limited right, granted by the owner of real property, to use all or part of his property for specific purposes” (Small, 1990: 2-5). Traditionally, an easement was “affirmative” (that is, carrying rights to specified actions) and “appurtenant” (that is, attached to a neighboring parcel of land). For example, one landowner might hold

an easement in the land of a neighbor, allowing him or her to cross the neighbor's property or draw water from the neighbor's well.

The use of easements for conservation purposes is a relatively recent phenomenon. In contrast to conventional easements, conservation easements are generally "negative" (that is, prohibiting specified actions) and "in gross" (that is, they may be held by someone other than the owner of a neighboring property). While a conventional easement involves the conveyance of certain affirmative rights to the easement holder, "an easement for conservation or preservation purposes involves the relinquishment of some of these rights (i.e. the right to alter or demolish a building or to cut down a forest) and the power in the new holder of the rights to enforce the restrictions on the use of the property" (Small, 1990: 2-6). This is a critical distinction: the landowner relinquishes the right to develop the land, but that right is not conveyed to the easement holder. That particular right (to develop the land) is extinguished. What the easement holder does acquire is the right to enforce the land-use restrictions (Powell, 1989). Consider the following analogy:

Say I own a car. I keep the car (with the ignition key), but give a neighbor my only key to the trunk. I have relinquished my ability to carry luggage in the trunk, but I have not given that ability to my neighbor. (No one has that ability now, since it requires possession of both the car and the key to the trunk.) What my neighbor has acquired is the ability to prevent me from carrying luggage in the trunk. What I retain is the car and the ability to drive the car and carry passengers.

When a landowner conveys a conservation easement to a government agency or a land trust, the landowner relinquishes his or her right to develop the land, but the landowner has not given that right to the land trust. What the land trust has acquired is the right to prevent the landowner from developing the land. What the landowner retains is the land and the right to use the land for less intensive purposes, such as agricultural production.

This issue is clouded because conservation easements are commonly said to represent "development rights." When a landowner conveys a conservation easement to a land trust, he or she does convey the development rights to the land trust. But these development rights

themselves do not give the land trust the right to develop the land. They are like the key to the trunk—necessary but not sufficient for development. Just as possession of both the car and the key to the trunk are required in order to carry luggage, possession of both the land and the development rights are required to develop the land. When these are separated, the right to develop the land is extinguished. (And just as the key to my trunk doesn't fit my neighbor's car, the development rights conveyed do not generally permit development of another parcel of land either, except under a transfer-of-development-rights program.)

Conservation easements have been used to protect a variety of land resources and characteristics, including farmland and other open space, wildlife habitat, erodible soil, and wetlands. A common feature of such resources is that their full value to society may not be reflected in the stream of returns considered by private landowners when choosing among alternative land uses. Wetlands, for example, provide benefits in terms of groundwater quality and recharge, floodwater retention, fish and wildlife habitat, and recreation. Of these benefits, however, only habitat and recreation are likely to afford income-generating opportunities to private landowners, and returns to these activities may be small in comparison with alternative land uses like agricultural production or urban development (Wiebe and Heimlich, 1995).

Conservation easements offer a way by which public interests in such resources can be formally established and acquired on a voluntary basis in order to ensure desired resource protection. Conservation easements are attractive as a policy tool because they "represent a mid-point between outright public ownership of significant property on one extreme and government land-use regulation on the other" (Land Trust Alliance and the National Trust for Historic Preservation, 1990: 2). As such, they can be used to help balance public resource use and conservation objectives while avoiding some of the financial costs of outright public ownership of land and some of the political costs of land use regulation—advantages that are particularly meaningful in the current climate of budget constraints and property rights considerations.

The National Park Service was one of the first public agencies to use easements when it preserved scenic views along the Blue Ridge Parkway in North Carolina and Virginia and along the Natchez Trace Parkway in Mississippi, Alabama, and Tennessee in

the 1930's and 1940's (Ward and others, 1989). The Fish and Wildlife Service acquired refuge and flowage easements in Minnesota, North Dakota, and South Dakota in the 1930's (Powell, 1989). The use of conservation easements by nonprofit organizations and government agencies has increased rapidly in recent decades. Table 1 suggests the variety of agencies involved in the acquisition of conservation easements.

Options

Options are themselves assets, but they are most commonly thought of as a means of buying or selling other assets. In a standard call option, an agent pays a premium for the option to buy an asset within a specified period at an agreed-upon price (the exercise price). If the actual value of the asset exceeds the exercise price within the specified period, the agent can exercise the option and buy the asset at the exercise price (and then realize a profit by re-selling the asset for its actual value). If the actual value of the asset does not exceed the exercise price within the specified period, the agent need not exercise the option. The premium depends on the value of the underlying asset (for example, land), the exercise price, the maturity of the option, the volatility of the value of the underlying asset, and the risk-free interest rate (Black and Scholes, 1973).

Real estate options can serve both as a means of acquiring the rights necessary to permit development and as a means of acquiring the rights necessary to prevent development. Consider a parcel of farmland, the value of which is made up of the value of the agricultural use rights and the value of the "development rights." An agent must hold both rights in order to develop the land. A developer might thus acquire an

option to buy a parcel of land for development within a certain period. To prevent development, a land trust or government agency might acquire one of the following assets prior to the developer's acquisition of the option:

- (1) a conservation easement (that is, the development rights),
- (2) the land itself (that is, both the development rights and the agricultural use rights), or
- (3) the agricultural use rights.

Holding any one of these assets would be sufficient to prevent development of the land for the period over which the various rights are specified.

Alternatively, the land trust or government agency could also prevent development by acquiring one of the following assets, each of which is an option on one of the assets listed above:

- (4) an option to buy a conservation easement,
- (5) an option to buy the land, or
- (6) an option to buy the agricultural use rights.

Although none of these options would convey the underlying assets themselves (unless and until the option is exercised), each would be sufficient to prevent development for the duration of the option.

An example of option (4) is found in Pennsylvania, where the Lancaster County Agricultural Preserve Board (LCAPB) and the Lancaster Farmland Trust

Table 1—Agencies involved in conservation easement acquisition

Type of agency	National	State & local
Public	Federal Government agencies (for example, the Natural Resources Conservation Service, the Forest Service, the Fish and Wildlife Service, and the National Park Service)	State & local government agencies (for example, the Maryland Agricultural Land Preservation Foundation and the Lancaster County Agricultural Preserve Board)
Private	National nonprofits (for example, The Nature Conservancy, the Trust for Public Land, the Conservation Fund, and the American Farmland Trust)	Land trusts (for example, the Trust for New Hampshire Lands, the Iowa Natural Heritage Foundation, the Maine Coast Heritage Trust, and the Montana Land Reliance)

Source: USDA/Economic Research Service.

recently acquired an option to buy a perpetual conservation easement on the farm where the movie “Witness” was filmed (Daniels, 1994; *Lancaster Farmland Trust News*, Dec. 1994).

While options constitute an interesting example of a partial interest in land, they are not commonly used as policy tools for resource use and conservation. As a result, this paper focuses on conservation easements.

The Federal Role in Partial Interests as Policy Tools

The Federal Government’s role in the use of partial interests as policy tools depends on how the partial

interests are conveyed. In the case of conservation easements, the Federal Government plays both a direct role and an indirect role. The direct role involves easement acquisition by Federal agencies—as in the case of the Wetlands Reserve Program. (The Conservation Reserve Program does not strictly acquire easements, at least in the legal sense, although the interests acquired are closely analogous in economic terms.) The indirect Federal role takes the form of Federal income and estate tax benefits that are available to landowners who donate conservation easements to qualified nonprofit organizations. These Federal roles are discussed in greater detail in the sections that follow.

Partial Interests in Three Policy Settings

Partial interests have long been used informally in a variety of agricultural policy contexts. Prior to the Federal Agriculture Improvement and Reform Act of 1996, acreage reduction programs required idling of a portion of base acreage in order to participate in Federal commodity programs, for example, while paid land-diversion programs offered program participants payments for additional idled acres. The “sodbuster,” “swampbuster,” and conservation compliance provisions of the 1985 Food Security Act continue to withhold Federal program benefits from producers who do not comply with various conservation requirements. All offer some form of Federal benefits in exchange for voluntary acceptance of restrictions on the use of private land.

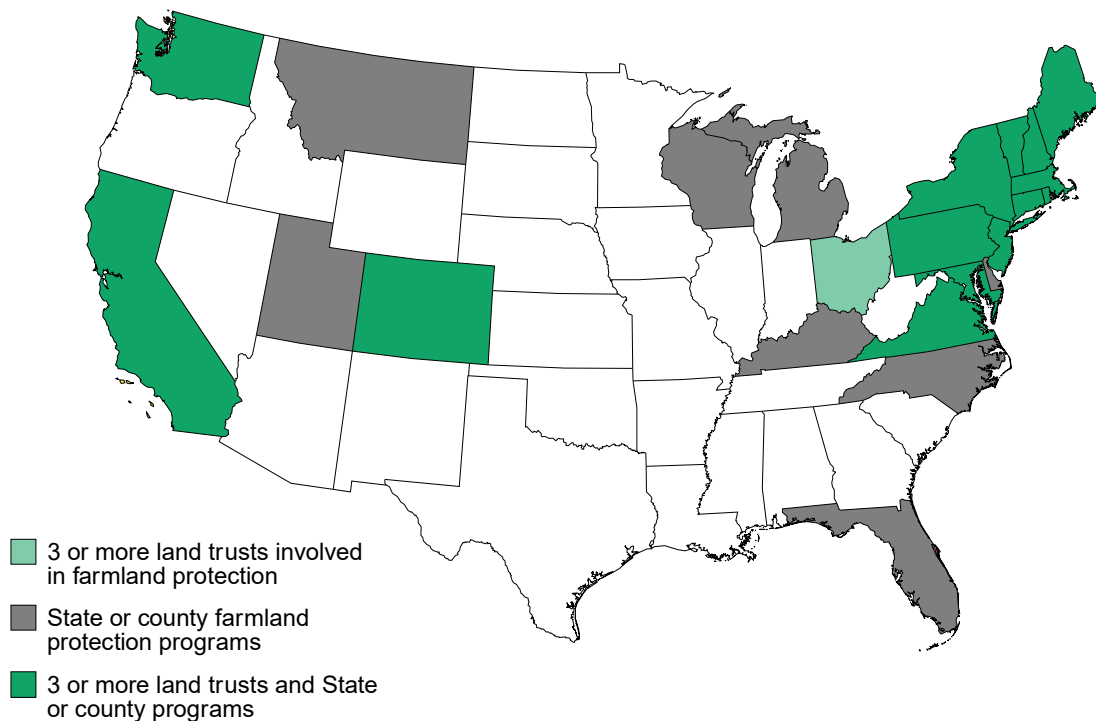
Partial interests are also used as agricultural policy tools in a number of more formal ways, including

several programs established or reauthorized by the 1996 Farm Bill. Farmland protection and the restoration and preservation of wetlands and land with highly erodible soil and other environmental characteristics are examples that illustrate a number of interesting similarities and contrasts with respect to resource use and conservation. This section examines how government agencies acquire and convey partial interests in these three policy contexts. Farmland protection efforts are most active in northeastern and west coast States, where urbanization pressure is greatest (figure 2). Conservation Reserve Program enrollment is concentrated in the Northern and Western plains, reflecting the distribution of highly erodible cropland (figure 3), while the Wetlands Reserve Program targets historic wetlands that have been converted to hydric cropland, most of which are located in the Corn Belt, the Southeast, and the Mississippi Delta States (figure 4).²

²Habitat, scenic or open space, and historic, recreational, and other land characteristics and resources are also protected by partial interests in a variety of public and private programs. These are not addressed directly here, but are similar to the cases that follow.

Figure 2

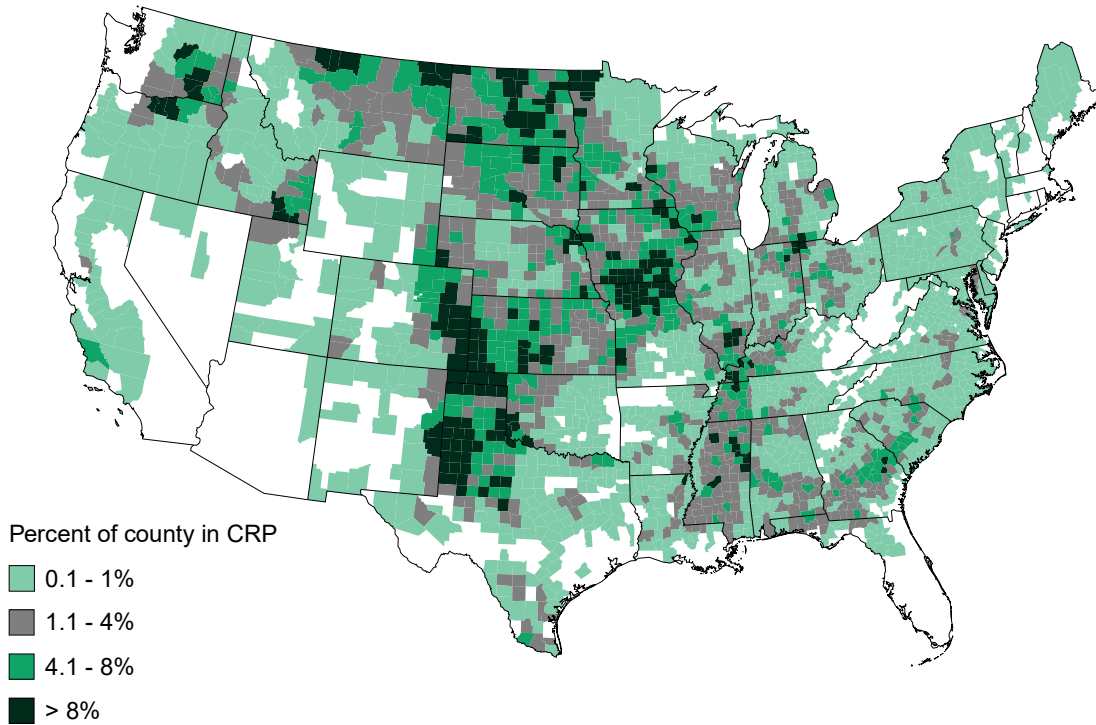
Farmland protection programs



Source: American Farmland Trust, Land Trust Alliance, *Farmland Preservation Report*, Natural Resources Conservation Service..

Figure 3

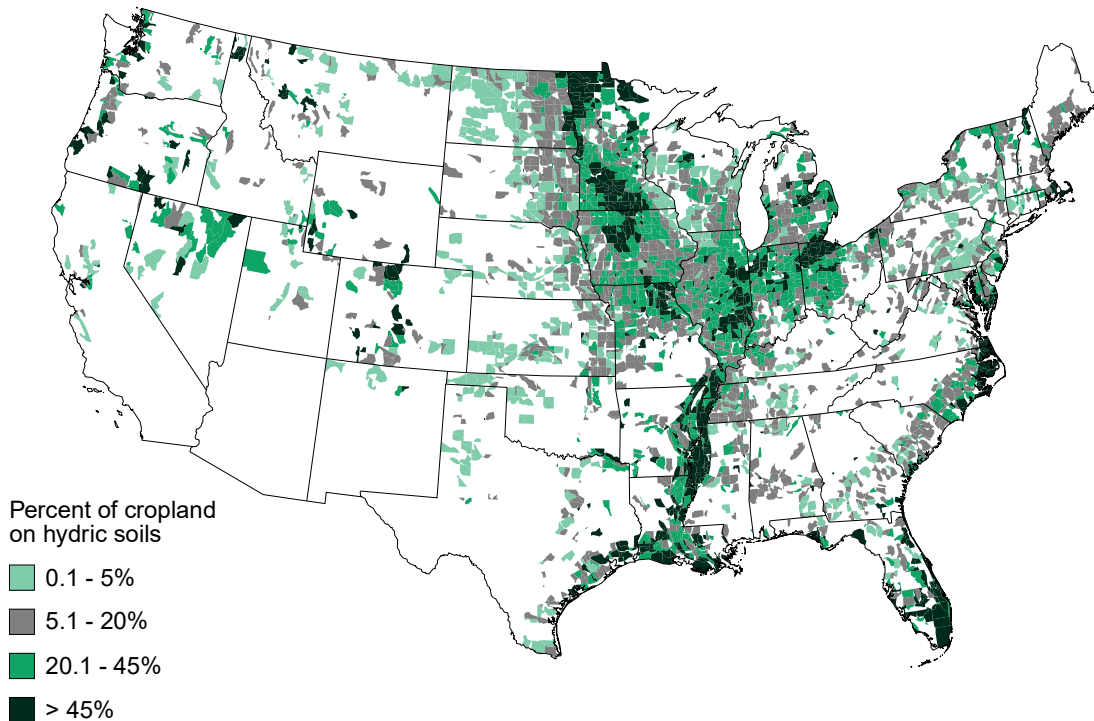
Conservation Reserve Program enrollment



Source: USDA/Economic Research Service based on data from Conservation Reserve Program files.

Figure 4

Lands eligible for the Wetlands Reserve Program



Source: National Resources Inventory.

Farmland Protection

Farmland protection programs have as their principal goal the conservation of privately owned land through the acquisition of partial interests. We begin with a review of the background and motivation for farmland protection.

Urbanization

The issue of urbanization and farmland protection has been debated over the past two decades. Suburban expansion and interstate highway construction beginning in the 1950's combined with growing environmental awareness in the 1960's and a perceived global food crisis in the 1970's to inspire concern about the loss of land suitable for agriculture in the United States. While farmland conversion had not previously been considered a problem, the U.S. Department of Agriculture's (USDA) Committee on Land Use recommended in 1975 that USDA take a major role in advocating the "maximum possible" retention of agricultural lands (USDA, 1975; Gardner, 1977; Schnidman, 1986).

USDA's Soil Conservation Service's (SCS) *Potential Cropland Study* in 1975 estimated that 16.6 million acres of rural, non-Federal land were converted to urban and built-up use between 1967 and 1975, and that a further 6.7 million acres were lost to water resource development projects (Dideriksen, Hidlebaugh, and Schmude, 1977). Together, these figures implied an average loss of 2.9 million acres of rural land per year over the period—a rate that was supported by SCS's 1977 National Resources Inventory (NRI) (Lee, 1984). This figure formed the basis of the Federal interagency National Agricultural Lands Study's (NALS) argument in 1981 that losses of agricultural land warranted urgent government action (Coughlin and Keene, eds., 1981).

NALS and the data on which it was based have been criticized on several grounds. First, measurement and classification errors were later found to have overstated the total acreage converted annually "by at least a factor of 2, and quite possibly by a factor of 3 or 4" (Lee, 1984; Fischel, 1982). Subsequent improvements in the NRI in 1982 and 1987 produced urbanization estimates of about 1 million acres per year, in line with Census estimates (Schnidman, 1986; Vesterby, Heimlich, and Krupa, 1994). Second, not all rural non-Federal land is cropland, farmland, or

even agricultural land (see box 1). Even the 1975 SCS study indicated that only 29 percent of land converted to urban and built-up use had been cropland—about 600,000 acres per year (Dideriksen, Hidlebaugh, and Schmude, 1977). Finally, Brewer (1981) and others have pointed out that agricultural land use is a dynamic process reflecting responses to changing price expectations, technology, and costs of production. As a result, while the area idled or in crops, forest, or pasture has fluctuated from year to year, the total acreage in cropland has remained virtually unchanged at about 465 million acres over the past 50 years (Vesterby, Heimlich, and Krupa, 1994; Daugherty, 1995). Of this total, about half is considered prime land, and almost all of that is located outside of the 135 rapidly urbanizing counties studied by Vesterby, Heimlich, and Krupa (1994).

Taken together, these points imply that urbanization does not pose a threat to the Nation's supply of prime cropland, or to its ability to produce food and fiber. Nevertheless, concerns about effectiveness in land use planning, environmental quality, lifestyle preservation, and the viability of local agricultural economies continue to justify attention to farmland protection at the local, State, and national levels. (Disney's proposed theme park in Prince William County, Virginia, provided a recent example of a case that raised national as well as local voices of support and opposition.)

Box 1—Land Use Classifications

Vesterby, Heimlich, and Krupa (1994: 5) distinguish *rural land* (all land not classified as urban), *agricultural land* (farmland plus privately cultivated land in wildlife refuges, etc.), *farmland* (land in farms), and *cropland* (land in crops, pasture, or idle).

Land use in the United States, 1987

	Million acres	Percent of total
Rural	2,208	97.5
Farmland	964	42.6
Cropland in farms	443	19.6
Other farmland	521	23.0
Other rural	1,244	54.9
Urban	57	2.5
U. S. total	2,265	100.0

Source: Vesterby, Heimlich, and Krupa (1994).

The Evolution of Farmland Protection Strategies

Over 90 percent of U.S. farmland is privately owned (Wunderlich, 1991). Short of outright acquisition, public efforts to influence the conversion of farmland to nonagricultural uses must therefore rely on a combination of regulatory and voluntary mechanisms. Early efforts to maintain rural land in agriculture relied primarily on local zoning ordinances authorized by State legislation (Anderson, Gustafson, and Boxley, 1975). Agricultural zoning ordinances may restrict nonagricultural uses completely or, more commonly, they may permit limited nonagricultural uses (Coughlin and Keene, eds., 1981). By maintaining socially desirable land uses, zoning protects the values of other properties in the community. But zoning's effectiveness is limited by legal and political challenges from landowners who wish to use their land for more intensive (and more profitable) purposes, particularly when zoning restricts land use after expectations of gains have already been established (Heimlich, 1994b). When pressure to "upzone" becomes too great, agricultural zoning alone may be insufficient as a farmland protection tool (Daniels, 1991).

To reduce economic incentives to convert farmland to more intensive uses, State and local governments developed other tools to supplement agricultural zoning. In 1956, Maryland became the first State to pass a law allowing farmland to be assessed for property tax purposes based on its current, agricultural use value rather than its full market value, which might reflect anticipated returns to future developed use (Malme, 1993). Today, all 50 States have preferential or use-value assessment laws, most of them combined with "roll-back" penalties of varying severity for farmland owners who convert their land (Aiken, 1989). By reducing the property tax burden on farmland owners, such laws were intended to reduce the difference in net returns between urban and agricultural use, and thus slow the rate of farmland conversion through voluntary incentives rather than regulation. Like zoning, however, preferential assessment has had only a limited effect on the pace of farmland conversion. Tax benefits from preferential assessment are generally insufficient to offset higher urban returns on land that is truly under development pressure. Thus, if penalties for farmland conversion are too lenient, they fail to prevent conversion from taking place. On the other hand, if penalties are high enough to prevent conversion, they typically discourage farmland owners from participating in the first place.

The inability of zoning and preferential assessment to prevent farmland conversion can be understood in terms of the ongoing debate regarding property rights and land use. Zoning can be interpreted alternatively as "a reasonable exercise of the police power of the state to further the public health, safety, and welfare" (Daniels, 1994), as the compulsory acquisition of development rights from landowners without compensation (Buist and others, 1995), or as an assertion of legitimate public ownership of those (development) rights. Malme (1993) notes that preferential assessment in effect represents the rental of privately held development rights by the public. While the legal bounds of public and private rights in land remain the subject of considerable debate, there appears to be growing recognition among policymakers that development rights are (at least *de facto*) held by the farmland owner, who must therefore be compensated if land-use restrictions are to be politically acceptable and effective in the long run. Cast in these terms, the inadequacy of zoning and preferential assessment as farmland protection tools can be attributed to the inadequacy of the compensation offered for public acquisition of development rights.

This recognition has led State and local governments as well as private nonprofit organizations to enter the market for partial interests in farmland more actively. In particular, two very similar types of programs are emerging in many parts of the country: "purchase-of-development-rights" (PDR) programs (also known as "purchase-of-agricultural-conservation-easement" or PACE programs) operated by State and local governments, and conservation easement acquisition programs operated by private nonprofit organizations.

Development Rights and Easements

As noted earlier, development rights and conservation easements are alternative terms for the partial interests in land that are relinquished by landowners when certain restrictions are placed on the use of their land. We use the terms interchangeably here. The use of easements for farmland protection is a relatively recent phenomenon. The Nation's first PDR program was established by Suffolk County, New York (on Long Island) in 1974, and the first statewide program was established in Maryland in 1977 (*Farmland Preservation Report*, April 1994). The nonprofit American Farmland Trust began acquiring agricultural conservation easements in 1983 (McNulty, 1994).

Under these programs, the landowner voluntarily surrenders development rights to a government agency or nonprofit organization and receives compensation in various forms for the restrictions placed on the land. The landowner retains title to the land and can sell or pass along the land to others, although the use of the land is limited primarily to farming and open space.³ The conservation easement runs with the land either in perpetuity or for a period of time specified in the easement document.

PDR programs differ from conservation easement acquisition programs operated by private nonprofit organizations primarily in the nature of the compensation they provide to the landowner. As implied by the name, PDR programs are often required to purchase development rights at their assessed full market value. Nonprofit organizations, on the other hand, are typically unable to offer full market value because of financial constraints. Instead, they take advantage of provisions in the Federal income tax code that offer landowners income and estate tax benefits when they donate conservation easements to qualified conservation organizations. These provisions, detailed in Section 170 of the Internal Revenue Code, have emerged from a series of Internal Revenue Service

³Such programs typically permit construction of a limited number of residential buildings on preserved properties. In Maryland, preserved properties have actually risen in value due to the demand for such "estate parcels" (Heimlich, 1994b).

(IRS) rulings and legislative actions dating back to 1964. (These tax benefits and the role they play in easement valuation and exchange are addressed in greater detail in the section "Valuation of Partial Interests in Land.")

The acquisition of conservation easements as a means of preserving farmland and open space has enjoyed increasing popularity over the past two decades, particularly in the Northeast, where urban pressure is high. Eleven statewide programs had been established as of April 1996 (table 2); several other States are currently in the process of establishing programs. Maryland's program (operated by the Maryland Agricultural Land Preservation Foundation) is both the earliest and the largest in terms of acreage preserved. Average costs range from \$598 per acre in Vermont to \$5,766 per acre in Rhode Island.

State programs represent less than half of farmland acreage preserved by conservation easements nationwide. Independent county and other local programs also acquire agricultural conservation easements. As with State programs, most of these are in the Northeast and California, but Peninsula Township, Michigan, launched the Midwest's first public PACE program in August 1994 (*American Farmland*, Fall 1994). In addition, private nonprofit organizations also protect farmland by acquiring agricultural conservation easements. The Land Trust Alliance reports

Table 2—State agricultural conservation easement programs, April 1996

State	Year established	Area preserved	Farms	Average cost
		<i>Acres</i>	<i>Number</i>	<i>Dollars/acre¹</i>
Maryland	1977	122,068	837	877
Massachusetts	1977	37,445	409	2,718
Connecticut	1978	25,192	165	2,951
New Hampshire ¹	1979	8,469	127	n.a.
Rhode Island ¹	1982	2,428	30	5,766
New Jersey	1983	28,713	195	3,236
Pennsylvania	1988	76,360	611	2,113
Vermont ¹	1988	36,580	111	598
Maine ¹	1990	307	1	1,238
Delaware	1991	8,500	31	n.a.
Kentucky	1994	0	0	—
11-State total		346,062	2,517	n.a.

n.a. = not available.

— = not applicable.

¹Data as of July 1995.

Sources: *Farmland Preservation Report* (April 1996 and April 1994); Thompson (1995); and *American Farmland* (Winter 1991-92).

that 38 percent of the 889 land trusts it surveyed in 1990 listed protection of farmland or cropland as a top priority (Land Trust Alliance, 1991). Some 456,000 farmland acres had been protected by conservation easements held by independent county programs and private land trusts across the country as of April 1994, for a State-county-private total of about 800,000 acres nationwide (*Farmland Preservation Report*, April 1994). Box 2 describes how public and private farmland protection easement programs operate side by side in Lancaster County, Pennsylvania.

Farmland protection easements offer a voluntary means to balance public and private goals without incurring the financial costs of full title acquisition or the political cost of land-use regulation. Easements achieve these goals by tailoring their provisions to meet specific program and landowner goals on specific parcels of land. As a result, however, easement acquisition can still involve substantial costs in negotiation and settlement. Data are scarce, but these costs appear to remain small relative to the cost of the partial interests themselves. For example, data from the Lancaster County Agricultural Preserve Board indicate that costs associated with survey, appraisal, title search and insurance, and related activities necessary to record an easement averaged about \$83 per acre preserved in 1993, whereas the easements themselves cost an average of over \$2,000 per acre (LCAPB, 1994). The Lancaster Farmland Trust incurred similar

costs (Musselman, 1994). Monitoring and enforcement costs can be substantially higher in some situations. (See the section “Markets for Partial Interests in Land” for more detail.)

The Federal Role in Farmland Protection

Prior to 1996, apart from its treatment of conservation easements in the tax code, the Federal Government’s role in farmland protection consisted primarily of two pieces of legislation. The Farmland Protection Policy Act (part of the 1980 Farm Bill) requires Federal agencies to identify and minimize adverse effects of their programs on farmland protection efforts and to ensure compatibility with State, local, and private farmland protection programs. The Farms for the Future Act (part of the 1990 Farm Bill) authorizes the establishment of an Agricultural Resource Conservation Demonstration Project which provides Federal loan guarantees and interest rate assistance to help States protect farmland. (So far, only Vermont has been authorized to participate.)

The 1996 Farm Bill increased direct Federal participation in farmland protection by establishing a Farmland Protection Program at the Federal level. This program is to protect 170,000 to 340,000 acres of prime, unique, or other farmland through USDA acquisition of easements or other interests in farmland, with funding of up to \$35 million from the Commodity Credit

Box 2—Farmland Preservation in Lancaster County, Pennsylvania

Lancaster County’s 4,700 family farms are among the Nation’s most productive. Nevertheless, urban growth has driven farmland prices as high as \$12,000 per acre in some areas, well above values supported by agricultural use alone. In the context of such conversion pressure, the Lancaster County Agricultural Preserve Board (LCAPB) (a public agency) and the Lancaster Farmland Trust (a private nonprofit organization) both use conservation easements among their farmland protection tools. To date, the Board has acquired 187 easements protecting 16,900 farmland acres, and the Trust has acquired about 60 easements protecting 3,600 farmland acres (LCAPB, March 1996).

While each program uses a variety of easement acquisition techniques, the Board generally pur-

chases easements for their appraised value, currently averaging about \$2,000 per acre, while the Trust relies more heavily on bargain sales and donations in exchange for tax benefits. The two programs complement rather than compete with one another. For example, Amish farmers, unwilling to accept government payments, are drawn to the Trust’s program, while “the English” are more likely to sell easements to the Board (Daniels, 1994).

Although such distinctions may be more pronounced than in many other parts of the country, they are indicative of the variety of landowner interests and characteristics that easement programs must address. The achievements of both public and private efforts in Lancaster County suggest that easement programs, and easements themselves, are flexible enough to address such variety successfully.

Corporation. Nearly \$15 million was allocated to protect farmland in 18 States in September 1996.

Indirectly, of course, the Federal Government influences farmland use in a variety of other ways. Federal commodity price support programs historically affected the profitability of agricultural production, for example, as conservation compliance requirements continue to do. On an even broader level, farmland use is influenced by provisions of the Federal tax code, as noted earlier. The Tax Reform Act of 1986 eliminated favorable treatment of capital gains, reducing incentives for sale of farmland for conversion.

Valuation

Whether by purchase, donation, or bargain sale, conservation easement acquisition entails the provision of compensation to the owner in exchange for the land-use restrictions imposed. Such compensation depends critically on the method of valuation applied. General issues and several specific alternative methods will be discussed and compared in the section “Valuation of Partial Interests in Land,” which also provides an example of the valuation of a farmland preservation easement.

The Conservation Reserve Program

The Conservation Reserve Program (CRP) is a program in which the Federal Government acquires partial interests in private land in order to accomplish resource conservation and other objectives. The CRP involves finite-term (typically 10-year) restrictions on the use of cropland with highly erodible soil and other environmental characteristics. We begin with a brief overview of soil erosion and the evolution of Federal soil conservation policy.

Soil Erosion

Soil erosion results from a combination of physical factors (such as soil texture, slope, wind, and rainfall) and management factors (such as cultivation practices). Impacts of soil erosion are felt both on-site, primarily in terms of soil productivity, and off-site, including impairment of water resource use and damage from windborne sand and dust (Heimlich, 1991). These off-site impacts generate public concern about how private land, particularly highly erodible cropland, is used.

With its roots in the widespread land-use changes induced by the Homestead Acts and westward expansion of the mid-19th century, soil erosion became a national issue in the 1930's, when inappropriate cultivation practices and loss of vegetative cover were blamed for the Dust Bowl and unprecedented flooding along the lower Mississippi River. Then, as now, virtually all cropland was privately owned.⁴ As a result, achievement of the broader benefits of soil conservation, including off-site and long-term productivity effects, has long attracted public policy efforts to influence the behavior of private landowners.

The Evolution of Soil Conservation Policy

Federal soil conservation policy has evolved through a process beginning with an initial period of incentives for cultivation that led to increased soil erosion. This was followed first by the partial withdrawal of incentives for cultivation and eventually by the creation of incentives for restoration and conservation of highly erodible lands under long-term protective cover. (There has been no direct Federal regulatory role in soil conservation, although conservation compliance and sodbuster provisions have quasi-regulatory characteristics, and regulatory programs do exist in some States and counties.)

The events that drew nationwide attention to soil erosion in the 1930's contributed to the creation of the Soil Conservation Service (SCS) in April 1935. Over the next several decades, SCS provided technical assistance to farmers through a variety of programs aimed at reducing soil erosion, restoring soil productivity, and conserving water on the land (Heimlich, 1991). During the 1930's and 1940's, the Federal Government also acquired 11.3 million acres of submarginal farmland from willing sellers through the Land Utilization Program, for retirement from cultivation and conversion to pasture, forest, range, wildlife habitat, or recreational areas (Wooten, 1965).

The first program to involve rental payments or acquisition of partial interests in land that remained in private hands, however, was the Soil Bank program, established in 1956 (Laycock, 1991; Berg, 1994;

⁴Some 99 percent of the cropland inventoried in the 1982 NRI was privately owned, and the NRI excluded less than 1 million acres of federally owned cropland.

Heimlich, 1991). The program's main purpose was to divert land from crop production in order to reduce commodity inventories; a secondary purpose was to establish protective cover on the land taken out of production (Berg, 1994). The program was voluntary. Farmers contracted to remove land from crop production for 3-10 years; in return they "received annual rental payments and 80% of the cost of installing a permanent land cover" (Heimlich, 1991; Magleby and others, 1995). Haying and grazing were prohibited (Heimlich, 1991). At the peak of the program, in 1960-61, there were 28.7 million acres under contract (Laycock, 1991).

After most contracts expired by 1969, only 20 percent of the land enrolled in the Soil Bank program stayed in permanent vegetative cover (Myers, 1991). A perceived global food crisis, strong export demand, and rising commodity prices beginning in the early 1970's (some of the same factors that contributed to concern about the conversion of farmland to urban uses) led to "near-record utilization of our cropland base," both in extent and intensity, and increased soil erosion (Heimlich, 1986, citing Hexem and Anderson, 1984). Even annual cropland retirement programs were suspended in 1973 (Berg, 1994). As a result, over 9 million acres were converted to cropland between 1975 and 1977, and 11 million more were converted between 1979 and 1981 (Heimlich, 1986).⁵

Rising concern over the potential environmental consequences of this increase in cultivated area, combined with growing commodity surpluses in the early 1980's, motivated another shift in soil conservation policy. Between 1977 and 1983, for example, cropland idled under the acreage reduction requirements of annual Federal commodity programs increased from zero to 78 million acres (Heimlich, 1991 and *Agricultural Resources*, Sept. 1992). Over the same period, a desire for longer term action led eventually to the conservation compliance, sodbuster, and CRP provisions of the 1985 Farm Bill.

The conservation compliance provisions of the 1985 Farm Bill required an approved conservation plan for farm program eligibility on highly erodible cropland.

⁵Despite concerns that these new croplands were highly erodible, only 21 percent of the 11 million acres converted between 1979 and 1981 were classified as highly erodible (Heimlich, 1986)—less than the 28 percent (118 million acres) of all cropland inventoried in the 1982 NRI (Heimlich, 1991).

Programs requiring conservation compliance include price support, loan rate, crop insurance, disaster relief, CRP, and Farm Service Agency loan programs (Canning, 1994). The sodbuster provision of the 1985 Farm Bill denies farm program benefits to farmers who convert highly erodible land after December 23, 1985, without carrying out an approved conservation plan (Heimlich, 1991). But the effectiveness of the sodbuster provision is limited by the relatively small degree of overlap between sodbusting and program dependence. Of the 11 million acres converted to cropland between 1979 and 1981, less than 2 million were both highly erodible and used to grow program crops (Heimlich, 1986). This emphasizes the importance of the third conservation initiative in the 1985 Farm Bill, the CRP.

The Conservation Reserve Program

The Conservation Reserve Program (CRP) is the largest long-term cropland retirement program in U.S. history, with more than 36 million acres enrolled at its peak in 1992-95. The primary goal of the CRP, as established in 1985, was to reduce soil erosion on highly erodible cropland. The 1990 Farm Bill gave increased emphasis to improving water quality, providing wildlife habitat, and addressing other environmental concerns (Osborn, 1994a). The CRP was also intended to protect production capacity over the long term, curb production of surplus commodities, and provide income support for farmers.

The CRP has achieved considerable success in meeting these objectives. Soil loss on land enrolled in the program has fallen from an estimated nationwide average of 20.9 tons per acre per year to 1.6 tons per acre per year, for a total soil erosion reduction of about 700 million tons each year (Margheim, 1994). Commodity program cost savings have been estimated at \$16-\$20 billion over the life of the CRP (Young and Osborn, 1990). The Economic Research Service estimates additional benefits in terms of soil productivity (worth \$1.6 billion); improved water quality (\$3.6 billion); air quality (\$0.5 billion); and wildlife hunting (\$3.8 billion) (Ribaud and others, 1990).

Administered by the Farm Service Agency (FSA; formerly the Agricultural Stabilization and Conservation Service (ASCS)), CRP is a voluntary program in which participants receive annual rental payments from USDA in return for diverting land from crop production and establishing and maintaining a protec-

tive cover of grass, trees, or other approved conservation practice. USDA also provides 50 percent of the cost of establishing the protective cover.

The farmer relinquishes the right to cultivate or graze or develop the land by granting the government the cultivation, grazing, and development rights on the land for 10 years. While the agreement reached is legally defined as a contract, it is, in its economic effect, a temporary conservation easement. The government holds the temporary cultivation, grazing, and development rights much like a land trust holds the perpetual development rights on a parcel of farmland under easement. In each case, the easement-holding party has the right to prevent more intensive use of the land (but not the right to use the land more intensively themselves). Participants agree to implement a conservation plan approved by their local conservation district to place the eligible acreage in grass or tree cover. Participants are not allowed to harvest, graze, or make commercial use of the forage for the duration of the contract (except in drought or similar emergency, in which case the Secretary of Agriculture may allow such uses).

As of the 1990 Farm Bill (beginning with the 10th CRP signup in 1991), farmers were allowed to submit up to four different types of bids. Standard bids, which comprise the majority of bids, involve conservation practices such as grass cover for which no useful life easement is required. Easement bids involve practices such as filter strips for which useful-life easements of 15 or 30 years are required.⁶ Wellhead standard and wellhead easement bids are similar to the first two types except that they are located in a protected wellhead area (Osborn, Llacuna, and Linsenbigler, 1992). Despite differences in name, however, each type represents at least an informal conservation easement with its own particular provisions.

The 1990 Farm Bill broadened the CRP's emphasis to include other types of environmentally sensitive land along with highly erodible cropland, and established conservation priority areas in the Chesapeake Bay, Great Lakes, and Long Island Sound regions. Farmed wetlands (wetlands that can be farmed under natural conditions) were eligible under the 1985 legislation, became ineligible as of the 10th signup, but are eligi-

⁶Authority to offer these easements was repealed after the 11th signup in the face of farmers' reluctance to grant formal, longer term easements for the same payments as under standard 10-year contracts.

ble again under the proposed rule issued in September 1996. Farmed wetlands are also eligible for the Wetlands Reserve Program (WRP), and wetlands contracted into the CRP may be converted to WRP easements.

As of the 12th CRP signup in June 1992, a total of 36.4 million acres were enrolled under 375,205 contracts, of which just 2.5 million acres had been enrolled under the revised procedures since 1990 (table 3).⁷ Only Arizona, New Hampshire, and Rhode Island have no acreage enrolled. In the first nine signups, between 1986 and 1989, CRP enrollment was concentrated in the Northern Plains, Southern Plains, and Mountain States, which together accounted for 62 percent of those periods' enrolled acreage. As a result of subsequent changes in bid acceptance procedures and eligibility criteria, the regional distribution of enrollment has shifted, and subsequent enrollments included much greater percentages from the Corn Belt, Delta, and Lake States (Osborn, Llacuna, and Linsenbigler, 1992)(see summary table on page iv).

State-average annual rental rates paid on CRP land range from a low of \$36.62 per acre per year in Alaska to a high of \$82.31 per acre per year in Iowa, with a national average of \$49.67 per acre per year (table 3). These rates are determined with reference to market rental rates on comparable cropland as described next.

Bidding and Valuation Procedures

Annual rental payments are determined through the submission of bids. Under the original signup procedure, once USDA certified that the cropland met eligibility criteria (based on its cropping history, ownership, and erodibility), the prospective participant would submit a bid to the county FSA office. (Ownership is not a requirement for eligibility if the person has operated the land for the 3-year period preceding the first year of the contract and will continue to control the land for the duration of the contract.) The acceptability of each bid was based on

⁷Since 1995, about 684,000 acres have been withdrawn without penalty under an "early-out" option allowed by USDA in May and June 1995. This acreage was replaced with more environmentally sensitive land in a 13th CRP signup in September 1995 (Osborn, Llacuna, and Linsenbigler, 1995). Contracts on an additional 2 million acres expired on schedule in September 1995, of which about three-quarters were re-enrolled for 1 year (Osborn, 1996).

Table 3—Conservation Reserve Program enrollment, signup periods 1-12 (March 1986-June 1992)

State	Number of contracts	Acres enrolled		Acres with tree plantings			Rental rate (dollars per acre per year, weighted average)	Erosion reduction (tons per acre per year, weighted average)	Cropland base reduction acres
		Total	Average per contract	Number of contracts	Total	Average per contract			
Alabama	10,113	573,190	56.7	6,701	311,130	46.4	42.62	17	226,520
Alaska	40	25,348	633.7	0	0	0.0	36.62	5	16,509
Arizona	0	0	0.0	0	0	0.0	0.00	0	0
Arkansas	3,418	260,006	76.1	1,897	150,862	79.5	48.73	14	140,706
California	511	187,499	366.9	13	1,572	120.9	48.59	14	96,594
Colorado	6,207	1,978,390	318.7	31	642	20.7	41.05	25	1,133,362
Connecticut	1	10	10.0	1	10	10.0	50.00	12	10
Delaware	30	995	33.2	7	173	24.7	66.00	8	611
Florida	2,497	134,860	54.0	2,410	122,967	51.0	41.69	15	50,782
Georgia	14,718	706,459	48.0	13,896	645,931	46.5	43.06	13	384,169
Hawaii	1	85	85.0	0	0	0.0	80.00	4	0
Idaho	3,907	877,059	224.5	49	2,869	58.5	45.70	16	559,679
Illinois	19,685	811,926	41.2	1,859	35,580	19.1	77.13	20	478,439
Indiana	11,539	462,649	40.1	1,057	18,066	17.1	73.96	15	258,999
Iowa	35,667	2,224,834	62.4	1,239	15,957	12.9	82.31	18	1,373,831
Kansas	31,020	2,937,863	94.7	160	3,067	19.2	52.82	16	2,161,826
Kentucky	8,102	451,317	55.7	188	3,878	20.6	59.31	33	241,661
Louisiana	1,785	146,571	82.1	967	79,244	81.9	44.06	12	62,066
Maine	941	38,490	40.9	164	2,569	15.7	49.50	7	6,671
Maryland	707	20,392	28.8	128	1,853	14.5	72.94	9	10,854
Massachusetts	5	32	6.4	1	10	10.0	47.65	7	21
Michigan	8,039	332,853	41.4	1,145	17,342	15.1	59.04	10	185,971
Minnesota	27,224	1,928,954	70.9	2,395	51,974	21.7	55.44	17	1,293,396
Mississippi	13,567	841,826	62.0	9,445	514,798	54.5	42.94	20	302,162
Missouri	22,804	1,726,835	75.7	629	20,920	33.3	63.33	19	836,894
Montana	7,925	2,854,307	360.2	27	1,238	45.9	37.24	13	1,848,192
Nebraska	14,449	1,425,423	98.7	389	4,182	10.8	55.68	22	935,619
Nevada	10	3,123	312.3	0	0	0.0	40.00	16	839
New Hampshire	0	0	0.0	0	0	0.0	0.00	0	0
New Jersey	30	723	24.1	2	27	13.7	52.85	16	184
New Mexico	1,518	483,181	318.3	0	0	0.0	37.83	42	393,611
New York	1,729	64,498	37.3	226	3,627	16.0	54.76	11	25,872
North Carolina	6,497	151,008	23.2	4,327	88,503	20.5	45.71	16	70,620
North Dakota	18,520	3,180,569	171.7	151	1,312	8.7	38.36	14	2,118,042
Ohio	8,542	377,089	44.1	927	12,450	13.4	71.01	10	188,774
Oklahoma	8,688	1,192,504	137.3	50	1,857	37.1	42.48	23	958,041
Oregon	2,012	530,766	263.8	54	3,215	59.5	49.06	11	451,571
Pennsylvania	2,649	101,078	38.2	120	2,242	18.7	63.11	16	39,597
Rhode Island	0	0	0.0	0	0	0.0	0.00	0	0
South Carolina	6,737	278,071	41.3	5,433	217,537	40.0	42.37	13	134,309
South Dakota	12,476	2,120,255	169.9	128	1,254	9.8	41.48	10	1,428,829
Tennessee	10,830	475,625	43.9	951	30,275	31.8	51.80	23	226,878
Texas	19,762	4,150,485	210.0	182	21,075	115.8	39.53	35	3,339,845
Utah	997	233,978	234.7	0	0	0.0	40.03	16	120,619
Vermont	10	193	19.3	0	0	0.0	50.00	13	17
Virginia	3,186	79,556	25.0	1,486	29,713	20.0	52.27	17	38,416
Washington	4,483	1,047,029	233.6	40	1,496	37.4	50.28	14	644,999
West Virginia	35	618	17.7	5	32	6.4	48.79	11	256
Wisconsin	20,789	746,530	35.9	4,121	66,277	16.1	66.79	13	365,960
Wyoming	795	257,224	323.6	1	8	8.0	38.43	13	125,260
Puerto Rico	8	455	56.9	3	34	11.3	60.36	35	0
U.S. total	375,205	36,422,733	97.1	63,005	2,487,767	39.5	49.67	19	23,278,085

Note: Regional totals are presented in the summary table on page iv. Source: USDA CRP contract data (Osborn, 1994b).

the erodibility of the acreage diverted. Different criteria could be established in various States and regions.

USDA reviewed all bids and determined maximum acceptable rental rates (MARRs) for multi-county pools. In general, all bids not exceeding the applicable pool MARR were accepted, creating an incentive for farmers to offer land worth less (in terms of market rental rates) than the applicable MARR. In fact, Osborn and Heimlich (1994: 30) cite evidence “that existing rental payments on a number of CRP acres exceed the amount necessary to keep land in conserving uses” by \$7-\$17 per acre. However, beginning with the seventh signup in 1988, even if a rental bid was less than or equal to the applicable multi-county MARR, it would not be accepted if the local FSA committee determined that the bid was higher than the local (for example, single-county) prevailing cash rental rate for comparable land.

The 1990 Farm Bill changed bid acceptance procedures. Revised procedures promoted rental rate competition among applicants and attempted to select acres that provided the greatest conservation and environmental benefits relative to the cost of CRP to the government. Eligible bids were forwarded to FSA headquarters, where rental payments requested by farmers were compared against soil-specific rental estimates for comparable local cropland. Bids that exceeded the estimated soil-specific rental rates (adjusted for costs of CRP participation) were rejected. Surviving easement and wellhead bids were automatically approved, while surviving standard bids competed for the remaining authorized acreage based on the ratio of an environmental benefits index to Federal costs (Osborn, Llacuna, and Linsenbigler, 1992).

The CRP case differs from the farmland protection case described earlier and the WRP case to follow in that CRP contracts represent finite-term (10-year) restrictions on land use. The result is that in cases like the CRP we speak of *renting* partial interests in land, whereas in cases like farmland protection or the WRP (to date) we are concerned with *buying* partial interests or granting perpetual rights to the use of the land.

Prospects for CRP Modification and Renewal

CRP contracts began to expire in 1995, with contracts on two-thirds of currently enrolled acreage scheduled to expire by 1997 (Osborn, 1994a). The future of

CRP acreage, and of the CRP itself, is of considerable interest and debate among farmers and farmland owners, environmentalists, and policymakers. Recent survey results indicate that half to three quarters of CRP acres will be returned to crop production when contracts expire (Osborn and Heimlich, 1994), although three quarters of the 2 million acres on which contracts expired in September 1995 were re-enrolled for 1 year (Osborn, 1996).

The 1996 Farm Bill capped CRP enrollment at 36,400,000 acres through the year 2002. USDA is authorized to enroll new land in the CRP to replace acreage on which contracts expire, although new acreage will have to meet higher selection criteria in terms of soil erosion, water quality, or wildlife benefits (Young and Shields, 1996). Participants who signed up before 1995 and have been in the program for at least 5 years are also allowed to terminate contracts on lands other than filterstrips, highly erodible land, and other environmentally sensitive areas.

Policymakers are considering a variety of options to maintain the conservation and environmental benefits of the CRP. In December 1994, USDA announced its intention to offer CRP participants the opportunity to modify and extend their contracts for another 10 years upon maturity, beginning in 1996 (USDA, Office of Public Affairs (OPA), Dec. 1994). Other options for future signups are currently under discussion.

Finite-term contract extensions may cost less in short-term outlays, but would only delay longer term decisions about the use of the land. In fact, some observers argue that more land could have been protected permanently if the 10 years' worth of rental payments on existing contracts had been applied initially to land purchase (Cook, 1994; Daniels, 1988). Alternatively, permanent easements could accomplish the same long-term protection—possibly at lower cost, depending on the nature of the restrictions—without expansion in Federal land ownership.

Options considered in a recent General Accounting Office (GAO) report on the CRP include acquisition of long-term or permanent easements, improved targeting and emphasis on buffer strips rather than whole fields, and allowance of limited economic uses such as grazing (U.S. GAO, Feb. 1995). Permanent easements would protect environmental benefits in perpetuity, but would face financial constraints and, in some cases, a lack of landowner interest. Lant, Kraft,

and Gillman (1995) estimated recently that less than half of Corn Belt farmers surveyed would enroll filter strips in 30-year easements, even at prices as high as \$4,000 per acre—higher than local land prices, ironically. Other evidence suggests that filter strips may be less popular candidates for conservation easements than larger parcels, however. A 1993 survey of CRP contract holders by the Soil and Water Conservation Society (SWCS) found that current contract holders would be willing to grant a permanent easement (prohibiting haying, grazing, and tree harvesting) on 19 percent of CRP acres nationwide, at an average asking price of \$573 per acre (Osborn, Schnepf, and Keim, 1994). When asked about a permanent easement *permitting* haying, grazing, and tree harvesting, contract holders indicated that they would be willing to grant such an easement on 27 percent of CRP acres nationwide, at an average asking price of \$647 per acre.

This last result seems inconsistent at first. An individual producer would be expected to offer a less restrictive easement for a lower price, since he or she retains use rights with greater value. In fact, a 1990 SWCS survey found that CRP participants would accept an average reduction of \$5 per acre in annual CRP rental payments in exchange for such a liberalization in easement terms (Osborn and Heimlich, 1994). The higher figure reported here may reflect the higher average reservation price of those contract holders who were simply unwilling to grant an easement that prohibited grazing and other uses at any price, but who were willing to grant a less restrictive easement.

The Wetlands Reserve Program

The Wetlands Reserve Program (WRP) is a program in which the Federal Government acquires conservation easements on private land in order to accomplish resource conservation and other objectives. We begin with a brief overview of wetlands and the evolution of Federal wetlands policy.

Wetlands

Wetlands are intermediate between terrestrial and aquatic ecosystems, and are generally defined as areas characterized by hydric soils, capable of supporting hydrophytic (that is, water-loving) vegetation, and subject to periodic saturation or inundation (Cowardin and others, 1979). Wetlands are found in coastal and

estuarine areas, around rivers and lakes, and in other areas such as prairies.

At the time of European colonization, the Fish and Wildlife Service estimates that there were about 221 million acres of wetlands in what are now the 48 contiguous States (Dahl, 1990). At that time, and for much of the period since, wetlands were generally seen as obstacles to more profitable use of land (for cultivation or development) and water (for navigation). To encourage settlement, Federal policy has historically focused on providing incentives for wetlands conversion. Between 1849 and 1860, for example, the Federal Swamp Land Acts transferred 65 million acres of wetlands to 15 States on the condition that the proceeds from their sale to individuals be used to convert wetlands to farmland (Carey, Heimlich, and Brazee, 1990). As a result of these and other incentives, about half the area under wetlands in the lower 48 States 200 years ago has since been lost. The majority of these losses are attributable to agricultural conversion, which claimed 87 percent of wetland losses between the mid-1950's and the mid-1970's (Frayer and others, 1983).

Attitudes in the second half of this century have gradually shifted toward protecting wetlands, as the benefits of wetlands are increasingly recognized. Wetlands are now known to perform a variety of beneficial functions in terms of water quality improvement, groundwater replenishment, floodwater retention, fish and wildlife habitat, and recreation. The problem for policymakers is that while these benefits are public in nature, most remaining wetlands are privately owned. The Environmental Protection Agency (EPA) estimates that 75 percent of all remaining wetlands are privately owned (U.S. EPA, 1993), while Heimlich and Langner (1986) estimate that 83 percent of remaining rural, non-Federal wetlands are privately owned. Thus, short of outright public acquisition of wetlands, protection of wetlands and their benefits requires land-use regulation and/or incentives to guide private decisionmaking.

The Evolution of Wetlands Protection Policy

The shift in attitudes toward wetlands has resulted in the gradual reversal of Federal wetlands policy over the past four decades. The evolution of wetlands protection policy has progressed along two tracks: the withdrawal of publicly provided incentives for wetlands conversion and the establishment of regulations and incentives for wetlands protection and even restora-

tion. The principal regulatory tool has been the Federal Water Pollution Control Amendments of 1972—the Clean Water Act. The Act’s Section 404 permit program regulates the discharge of dredge and fill material into navigable waterways, defined to include wetlands. But the legislation itself did not cover drainage, and it was only in 1992 that the U.S. Army Corps of Engineers began restricting drainage activities. Even so, normal agricultural practices are exempted, so wetlands on agricultural lands have not been greatly affected (Carey, Heimlich, and Brazee, 1990).

The reversal of publicly provided incentives for wetlands conversion proceeded both before and after the regulatory changes of 1972. In the Prairie Pothole region of the upper Midwest, the Fish and Wildlife Service’s Small Wetlands Acquisition Program (SWAP) began acquiring permanent easements on wetlands and adjacent uplands in 1958.⁸ In the same area, USDA’s Water Bank Program began negotiating renewable 10-year contracts to protect wetlands in 1972. President Carter’s Executive Order 11990 in 1977 ended all direct Federal assistance for wetland conversion, including assistance with drainage and channelization. Some indirect incentives, such as farm program benefits, were eliminated by the “swampbuster” provision of the 1985 Food Security Act, which denied program benefits to farmers who plant annual crops on wetlands converted after 1985. Other indirect incentives were eliminated by the Tax Reform Act of 1986, which eliminated favorable treatment of capital gains from land conversion and restricted landowners’ ability to write off drainage costs, thereby reducing incentives for the sale or conversion of wetlands. In August 1993, the Clinton administration reaffirmed the goal of “no net loss” of wetlands first articulated by President Bush, proposed measures to increase the efficiency of the Section 404 permit process and close loopholes allowing destruction of wetlands through drainage and excavation, and promised increased funding for wetland restoration and mitigation banking (Wiebe and Heimlich, 1995).

These initiatives have helped slow the rate of wetlands conversion, particularly for agricultural purposes. Whereas an estimated 690,000 acres were converted annually between the mid-1950’s and the mid-

⁸SWAP currently has 1.2 million acres of wetlands under perpetual easement in Montana, Nebraska, North Dakota, and South Dakota, at a cost of \$46.7 million, or \$38 per acre. The program also holds an additional 76,300 acres in associated grassland easements at \$4.9 million, or \$64 per acre (Hartmann, 1993).

1970’s, 87 percent of them to agricultural use, the conversion rate had fallen to an estimated 156,100 acres annually between 1982 and 1992, of which less than 20 percent were to agricultural use (USDA, Soil Conservation Service (SCS), 1992 NRI). In recent decades, urban development has replaced agriculture as the major threat to remaining wetlands. Excluding Alaska, the Fish and Wildlife Service estimates that about 104 million wetland acres remain today (Dahl, 1990). Based on 1992 NRI data, the Natural Resources Conservation Service (NRCS) estimates that about 108 million wetland acres remain on rural, non-Federal land, concentrated in the Southeast and upper Midwest.

Despite the achievements of these wetland protection policies, their scope remains limited. Wetland regulations are subject to challenges by private property owners seeking compensation from the Federal Government for regulatory “takings.” Swampbuster and other forms of conservation compliance are limited in their effectiveness by the relatively small extent of areas in which farm program dependence and wetlands coincide (Carey, Heimlich, and Brazee, 1990). The compliance leverage that farm programs themselves provide will diminish with declining program payments. These factors have led to an increasing reliance on direct incentives for wetlands protection, including an extension to wetlands restoration. This reliance is most evident in the Wetlands Reserve Program.

The Wetlands Reserve Program

The Wetlands Reserve Program (WRP) was authorized by the Food, Agriculture, Conservation, and Trade Act of 1990. The intent of the WRP is to restore and permanently protect wetlands by enrolling a total of 1,000,000 acres of farmed wetlands, wetlands converted to agricultural use prior to December 23, 1985, and functionally dependent adjacent land, in calendar years 1991-95.⁹ This is to be accomplished through the purchase of conservation easements from willing landowners. While the initial authorizing legislation allowed easement terms of 30 years to perpetuity, the implementing regulations for the first two signups restricted the program to perpetual easements (16 US Code 3837). Thirty-year easements were allowed in the third signup, but with much lower priority than perpetual easements (Buland, 1995). The

⁹Subsequently changed to a maximum of 975,000 acres by the year 2002.

1996 Farm Bill directed that, effective beginning October 1, 1996, to the maximum extent practicable, one-third of new acreage be enrolled under permanent easements, one-third under 30-year easements, and one-third under restoration cost-share agreements.

A restoration plan for each enrolled property must be worked out in consultation with NRCS and the Fish and Wildlife Service, with costs to be shared by the Federal Government. In the case of permanent easements, the Federal share is 75-100 percent of eligible costs; in the case of 30-year easements or restoration cost-share agreements, the Federal share will be 50-75 percent. Compatible uses of the wetland under easement are allowed if specifically permitted in the restoration plan. The wetland easement runs with the land (that is, it is binding on all subsequent landowners), but may be modified or terminated at the mutual agreement of the landowner and the Secretary of Agriculture. The program was originally administered by ASCS, but is now administered by NRCS.

As farmland protection easements represent the conveyance of development rights from landowners to government agencies and nonprofit organizations, and as CRP contracts represent the conveyance of cultivation, haying, grazing, and development rights to USDA, WRP easements represent the conveyance of cultivation and development rights from landowners to USDA. This does not mean that USDA gains the right to cultivate the land under easement, but simply that USDA gains the right to enforce the use restrictions imposed on the land. Under the terms of the reserved-interest easement, the landowner retains the right to hunt and fish, and, subject to approval by NRCS, may use the easement-encumbered land for other purposes that are compatible with the purpose of the wetland conservation easement, including timber production and harvesting, haying, and grazing, provided the objectives of the WRP easement continue to be fulfilled (Misso, 1995).

Enrollment for a 50,000-acre pilot program took place in June 1992, in California, Iowa, Louisiana, Minnesota, Mississippi, Missouri, New York, North Carolina, and Wisconsin. Stated objectives included the restoration and protection of wildlife habitat, surface and groundwater quality, flood water retention, open space and aesthetic values, and educational opportunities. A total of 2,337 intentions to participate were received for the pilot program, representing 462,078 acres. Of these, 49,888 acres were accepted

(over half of them in Mississippi and Louisiana) on 265 farms for a total Federal cost of \$46 million (USDA, ASCS, 1993). An average of \$742 of the \$923 per acre total cost went to easement purchase; restoration, technical assistance, and settlement fees averaged \$52, \$124, and \$4 per acre, respectively.

The WRP was funded at \$66.7 million to enroll up to 75,000 acres in fiscal year 1994. The second signup was held from February 28 to March 11, 1994, with landowners in 20 States eligible. The expanded pool included the original nine States, plus Arkansas, Illinois, Indiana, Kansas, Nebraska, Oregon, South Dakota, Tennessee, Texas, Virginia, and Washington. The second signup also differed from the first in that State ASCS committees were given greater discretion in selecting wetlands that meet specific State environmental goals (USDA, OPA, 5 January 1994). During the second signup period, 5,775 farmers and ranchers in 20 States offered 590,020 acres for enrollment, over 40 percent of which were in Mississippi, Louisiana, and Arkansas.

About 118,000 acres nationwide were expected to be enrolled as a result of the third signup in June 1995 (USDA, OPA, 9 May 1995), out of 572,500 acres offered by more than 3,700 landowners (Buland, 1995). Since 1992, a total of over 7,000 applications have been received, representing over 1 million acres (table 4). About 315,000 acres have been enrolled to date, at an average easement cost of about \$600 per acre.

The Emergency Wetlands Reserve Program

In response to the Midwestern flooding of 1993, an emergency WRP enrollment was authorized for eight of the nine most severely affected States: Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin (*Federal Register*, 1993). Of these, Illinois, Kansas, Nebraska, and South Dakota had not been eligible for the 1992 WRP pilot program. (Of the nine States most severely affected by the flooding, only North Dakota is not participating in the WRP or the EWRP. North Dakota statutes restrict Federal acquisition of wetlands easements to no more than 30 years, and restrict all easements in gross to a maximum 99-year period—Arnold, 1993.) As was the case with the regular WRP, program rules specify the use of permanent reserved-interest easements. The emergency program is also administered by NRCS, with an initial spending level of \$15 million (about 25 percent of the agency's \$60 million in Emergency Watershed Program funding).

Table 4—Wetlands Reserve Program and Emergency Wetlands Reserve Program, 1992-96

State	Wetlands Reserve Program				Emergency Wetlands Reserve Program				WRP & EWRP	
	Applications		Enrollment		Applications		Enrollment		Enrollment	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Alabama	89	3,500	6	919	0	0	0	0	6	919
Alaska	1	626	1	626	0	0	0	0	1	626
Arizona	0	0	0	0	0	0	0	0	0	0
Arkansas	556	104,542	103	28,883	0	0	0	0	103	28,883
California	415	169,338	44	15,561	0	0	0	0	44	15,561
Colorado	28	1,040	10	725	0	0	0	0	10	725
Connecticut	5	341	3	112	0	0	0	0	3	112
Delaware	6	52	3	52	0	0	0	0	3	52
Florida	0	0	0	0	0	0	0	0	0	0
Georgia	115	15,682	4	2,005	0	0	0	0	4	2,005
Hawaii	0	0	0	0	0	0	0	0	0	0
Idaho	13	700	2	102	0	0	0	0	2	102
Illinois	216	21,136	66	5,795	33	12,736	20	5,651	86	11,446
Indiana	597	25,287	61	3,426	0	0	0	0	61	3,426
Iowa	310	19,887	211	15,860	645	57,551	330	36,774	541	52,634
Kansas	80	5,834	44	3,894	5	146	4	142	48	4,036
Kentucky	187	16,830	9	1,420	0	0	0	0	9	1,420
Louisiana	553	127,549	187	61,912	0	0	0	0	187	61,912
Maine	11	1,000	3	500	0	0	0	0	3	500
Maryland	16	1,693	12	1,483	0	0	0	0	12	1,483
Massachusetts	14	310	2	30	0	0	0	0	2	30
Michigan	82	3,191	34	1,995	0	0	0	0	34	1,995
Minnesota	379	23,629	56	4,493	85	3,000	27	2,241	83	6,734
Mississippi	389	111,044	130	57,872	0	0	0	0	130	57,872
Missouri	1,005	92,324	198	23,306	496	65,275	128	21,927	326	45,233
Montana	11	2,819	7	2,499	0	0	0	0	7	2,499
Nebraska	261	23,655	39	5,111	13	233	4	55	43	5,166
Nevada	0	0	0	0	0	0	0	0	0	0
New Hampshire	24	103	3	103	0	0	0	0	3	103
New Jersey	7	320	2	195	0	0	0	0	2	195
New Mexico	0	0	0	0	0	0	0	0	0	0
New York	154	7,446	58	3,192	0	0	0	0	58	3,192
North Carolina	54	10,725	28	10,725	0	0	0	0	28	10,725
North Dakota	0	0	0	0	18	1,500	2	235	2	235
Ohio	350	13,000	62	2,882	0	0	0	0	62	2,882
Oklahoma	141	41,676	23	12,777	0	0	0	0	23	12,777
Oregon	33	12,134	17	8,277	0	0	0	0	17	8,277
Pennsylvania	35	1,000	19	516	0	0	0	0	19	516
Rhode Island	0	0	0	0	0	0	0	0	0	0
South Carolina	120	7,500	18	2,333	0	0	0	0	18	2,333
South Dakota	149	10,670	84	5,913	152	15,850	81	9,904	165	15,817
Tennessee	189	21,328	24	5,746	0	0	0	0	24	5,746
Texas	87	73,618	13	9,021	0	0	0	0	13	9,021
Utah	5	3,370	0	0	0	0	0	0	0	0
Vermont	43	781	6	200	0	0	0	0	6	200
Virginia	140	21,000	16	623	0	0	0	0	16	623
Washington	105	8,869	23	4,072	0	0	0	0	23	4,072
West Virginia	0	0	0	0	0	0	0	0	0	0
Wisconsin	164	10,940	134	9,935	0	0	0	0	134	9,935
Wyoming	13	2,450	4	84	0	0	0	0	4	84
U.S. total	7,152	1,018,938	1,769	315,175	1,447	156,291	596	76,929	2,365	392,104

Note: Regional totals are presented in the summary table on page iv.
Source: WRP and EWRP program data (USDA, NRCS, 1996).

Stated objectives beyond those of the regular WRP include floodway enhancement and proximity to other protected wetlands. To be eligible, the cost of cropland restoration and/or associated levee repair must exceed the land's fair market value (that is, its pre-flood value as cropland). The emergency WRP also involves local offers to farmers, as opposed to the regular WRP's national bid scheme (Pins, 1993). About \$2 million was allocated to buy easements on 3,000 acres from 11 landowners in a single levee district in southern Iowa, with the land subsequently to be transferred to the Fish and Wildlife Service for management as a fish and wildlife refuge (Vosick, 1993; see box 3).

A second EWRP signup subsequently took place for the same eight States, to permit signup of the remaining acres submitted but not accepted in the first signup period as well as other eligible land (Butz, 1994). The second signup period ran from April through December 1994 (*Agricultural Outlook*, May 1994, *Land Letter*, 1 May 1994). Over the two signup periods, a total of 943 applications were received, offering 77,924 acres for enrollment. Of these, 613 applications (65 percent) were approved, representing a total of 57,254 acres (73 percent of those offered). A third EWRP signup began in June 1995, along with the third signup for the regular WRP (Buland, 1995). Since 1993, a total of over 1,400 applications have been received, representing over 156,000 acres (table

4). About 77,000 acres have been enrolled to date, most of them in Iowa and Missouri.

Bidding and Valuation

Under the WRP, landowners submit bids representing the payment they are willing to accept for granting an easement on their eligible land. Program provisions state that bids meeting eligibility requirements will be ranked on the basis of environmental benefits per government dollar spent on restoration and easement acquisition. Easements will not be acquired for amounts exceeding the difference between the fair market value of the land before and after the easement is put in place (USDA, ASCS, 1992). Under the EWRP, NRCS consulted with other Federal agencies, commodity groups, farm managers, appraisers, and environmental groups to establish uniform easement values that would be offered to eligible landowners in each flood-affected area.

In contrast to the CRP case, where restoration costs are lower and areas of restorable cropland are relatively large, WRP is targeted at a smaller area of agricultural wetlands for which restoration costs are relatively high. As a result, annual rental payments for finite-term easements may make more sense for the CRP, whereas one-time payments for permanent easements may be more appropriate for the WRP (Heimlich, 1994b).

Box 3—Wetlands Restoration and Floodplain Management in Louisa County, Iowa

Levee District 8 covers 3,000 acres of Iowa River floodplain in southeastern Iowa's Louisa County. Prior to 1993, the district had received Federal funds to repair flood-damaged levees 14 times, at a cost of nearly \$4 million (in 1993 dollars). The 1993 floods caused a further \$757,000 in levee damage (Dettman, 1994). Rather than repair the levees again, the district's Board voted in March 1994 to discontinue agricultural operations and disband the district.

As a result of an agreement among landowners, State and Federal agencies, and private conservation organizations, most of the land formerly protected by the district's levees is being reclaimed as part of the Iowa River's natural floodplain and restored to bottomland hardwood forest. The area will be maintained by the U.S. Fish and Wildlife Service as part of its Mark Twain Wildlife Refuge. In addition

to providing wildlife habitat, recreation, and educational opportunities, the restoration will ease flooding downstream.

The agreement is being implemented through a variety of integrated land-acquisition efforts. Most of the district's landowners granted permanent easements to the Federal Government under the Emergency Wetlands Reserve Program. Private conservation organizations are purchasing other interests in land. In all, more than a dozen Federal, State, local, and private agencies contributed to the effort, including the Natural Resources Conservation Service, the Fish and Wildlife Service, the Environmental Protection Agency, the Federal Emergency Management Agency, the Iowa Department of Natural Resources, the Iowa Natural Heritage Foundation, the Conservation Fund, The Nature Conservancy, Pheasants Forever, Ducks Unlimited, the Fish and Wildlife Foundation, and the Louisa County Soil and Water Conservation District.

Markets for Partial Interests in Land

Markets take a wide variety of forms, from highly centralized exchanges to individually negotiated transactions. The form a particular market takes depends on many factors, including the characteristics of the asset being traded. In the case of homogeneous commodities like gold, buyers and sellers will be indifferent about the particular lot they actually receive.

Land represents the opposite case: it is not easily standardized and buyers and sellers are very interested in the particular characteristics of the specific parcel being traded.

Markets do not emerge fully developed. Instead, markets evolve over time, generally beginning with individually negotiated contracts, proceeding to the use of brokers and intermediaries, and finally developing into more transparent markets with even wider participation. Most security and commodity markets evolved in this manner. Might a market in partial interests in land be expected to undergo a similar evolution?

Conservation easements are typically transferred by two principal techniques: donation (or bargain sale) and exchange at fair market value. The two strategies may attract different types of participants, both among landowners who wish to convey easements (the “supply side” of the market) and among organizations that wish to acquire easements (the “demand side” of the market). Next, we examine the various participants in markets for conservation easements, the incentives that motivate them to participate, and the ways in which transactions are conducted.

Participants

Markets for conservation easements are made up primarily of landowners interested in conveying easements, and by public agencies and nonprofit organizations interested in facilitating easement acquisition or in acquiring easements themselves. In a broader sense, however, the market also includes developers, since they represent the demand for land conversion, which gives land value above and beyond the value it has in its current use. Each participant’s behavior is guided by different objectives and constraints.

Landowners

From time to time landowners must make implicit or explicit decisions about the interests in land that they

hold. For many landowners such decisions are forced by tax considerations related to estate planning (Small, 1992). Federal income and estate tax benefits for conservation easement donation may have a significant effect on whether, and how, landowners choose to dispose of interests in land. Specific strategies will prove more or less attractive depending on individual landowners’ circumstances, but several general alternatives are available. First, a landowner could retain the full fee interest in his or her land and then bequeath it to his or her heirs. Inheritance would trigger estate tax liability against the heirs for the fair market value of the property.

A second alternative would be for the landowner to sell the property. Sale of the fee would trigger capital gains taxes. Furthermore, since the net returns to a fair-market-value sale would remain part of the landowner’s financial estate even after the land itself was sold, the heirs would still be liable for estate taxes on any portion of that value that remains unspent at the time of the landowner’s death.

A third alternative would be for the landowner to sell an easement on the property at fair market value, and subsequently to sell the residual interest or bequeath it to his or her heirs. As far as tax treatment is concerned, this alternative is basically equivalent to the second, since no savings on capital gains or estate taxes would be realized.

A fourth alternative would be for the landowner to donate an easement (or sell it at a bargain price) to a qualified government or nonprofit organization, and then sell or bequeath the residual interest at a later date. This would generate income tax benefits during the landowner’s lifetime as well as estate tax benefits for his or her heirs. These benefits may be substantial, but they do not generally approach the financial value of a market-value easement sale. Thus, this strategy generally requires other incentives on the part of the donor, such as a wish (for example, when faced with the prospect of a sale forced by estate tax liability) to see his or her land preserved intact, in its current condition, within the family. Purchase of easements at market value is considerably more expensive to the acquiring agency, but expands the pool of landowners who might be interested in participating to include those who do not wish (or cannot afford) to donate.

Since the magnitude of income and estate tax benefits depends on the landowner’s financial status, some

landowners may realize larger benefits than others. This suggests that some landowners may require a stronger “conservation ethic” than do others to motivate an easement donation, while other landowners may be unable to afford to donate an interest, and be able to convey an easement only via sale at fair market value.

Developers

While landowners represent the “supply side” of the market for conservation easements, developers represent one component of the “demand side” of the market. Developers are not typically interested in acquiring conservation easements *per se*, although they may be in those cases where preserved open space enhances the value of adjacent residential lots. More generally, however, developers are interested in acquiring the right to develop a property. As we noted earlier, the right to develop a property is made up of the development rights on a property (those rights extinguished by a conservation easement) *together with* the residual rights retained by the landowner. It is this interest in development (or in any other use more profitable than current use), in competition with the interest in conservation on the part of public agencies and nonprofit organizations, that helps determine the price of conservation easements.

Public Agencies

Public agencies generally purchase conservation easements at their fair market value. On the one hand, this makes participation possible for landowners who may not be in a position to benefit sufficiently from income and estate tax incentives. On the other hand, it also limits participation to the number that can be accommodated by public funding. In Pennsylvania, for example, the Lancaster County Agricultural Preserve Board currently has a waiting list of 5 to 10 years for farmland owners interested in selling easements (Daniels, 1994), while the WRP and the EWRP have attracted offers of three times as many acres as funding levels have permitted to be enrolled.

While many landowners may not realize significant tax benefits from easement donation, for other landowners these benefits may be significant. In combination with other objectives, such as a desire to see a property preserved in its undeveloped condition, these benefits may be sufficient to motivate an easement donation or bargain sale. It is precisely these

cases where nonprofit organizations focus their attention and enjoy their greatest successes.

Nonprofit Organizations

Nonprofit organizations are private agencies that perform a variety of private and public functions. While they may not receive public revenue, those that serve qualifying religious, scientific, educational, charitable or other purposes are publicly supported in the sense that they are exempted from Federal income taxation (26 USC 501). Nonprofit conservation and environmental organizations help create and participate in markets for conservation easements at both the local and national levels.

Land trusts are nonprofit conservation organizations that protect land with valuable habitat, scenic, and other environmental characteristics through involvement in voluntary land transaction activities. Due to financial constraints, land trusts generally seek to acquire conservation easements from landowners by donation or bargain sale, often relying on the incentives offered by the Federal income and estate tax code.

The number of land trusts and the area they protect have increased rapidly in recent years. Nationwide, 1,145 local, State, and regional land trusts were identified by the Land Trust Alliance in 1994, an increase of 30 percent over 1990 (Wiebe, 1995). California, Massachusetts, and Connecticut had the greatest number of land trusts in 1994, with 166, 122, and 112, respectively (table 5). All but three States (Arkansas, Oklahoma, and South Dakota) had at least one land trust. New Hampshire had the greatest total acreage protected (1.1 million acres), followed by Montana (0.8 million) and California (0.5 million). New Hampshire also had the greatest acreage protected by ownership as well as the highest proportion of State area protected. Montana had the greatest acreage protected by easement, while California had the greatest acreage protected by acquisition and transfer to a third party (such as a government agency). Total acreage protected by local, State, and regional land trusts was 4 million acres, or 0.18 percent of U.S. land area, with 772,296 acres under conservation easement. Nationwide, 46 percent of land trusts listed habitat among their three highest priorities in 1990, followed by open space with 38 percent and wetlands with 28 percent (Wiebe, 1994). About 14 percent reported active involvement in farmland protection.

Table 5—Land protected by local, State, and regional land trust in the United States as of 1994

State	Land trusts		Acres protected ¹		Means of land protection ²				Total as a percent of State area
	Number	Change since 1990	Total	Change since 1990	Owned	Transferred	Under easement	Other	
	<i>Number</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>-----Acres protected-----</i>				<i>Percent</i>
Alabama	3	-25.0	22,077	2.5	19,154	538	0	2,385	0.07
Alaska	1	0.0	737	21.9	17	0	720	0	0.00
Arizona	6	50.0	1	*	1	0	0	0	0.00
Arkansas	0	*	0	*	0	0	0	0	0.00
California	166	112.8	484,070	24.5	68,544	305,325	50,387	59,813	0.48
Colorado	24	50.0	31,297	26.6	7,225	2,188	11,779	10,105	0.05
Connecticut	112	-1.8	42,575	19.9	26,175	2,605	10,829	2,967	1.37
Delaware	3	0.0	33,816	11.7	19,791	2,139	1,050	10,836	2.73
Florida	27	50.0	103,397	345.8	27,163	48,854	18,270	9,110	0.30
Georgia	14	366.7	988	585.8	204	0	774	10	0.00
Hawaii	4	100.0	78	*	75	0	3	0	0.00
Idaho	6	100.0	2,672	8.4	673	1,537	362	100	0.01
Illinois	27	-10.0	44,288	2.7	8,253	25,948	2,443	7,645	0.12
Indiana	6	20.0	1,982	1,357.6	1,954	3	10	16	0.01
Iowa	5	-16.7	27,457	36.0	5,478	110	490	21,379	0.08
Kansas	1	-50.0	16	*	0	0	16	0	0.00
Kentucky	8	60.0	9,144	2,566.0	557	25	264	8,298	0.04
Louisiana	1	0.0	1,423	-5.1	0	0	1,423	0	0.00
Maine	76	22.6	94,125	74.2	9,430	4,457	28,732	51,507	0.47
Maryland	36	16.1	64,949	57.8	6,992	4,484	51,646	1,827	1.03
Massachusetts	122	6.1	160,782	12.4	94,425	20,715	29,851	15,791	3.21
Michigan	28	33.3	27,325	56.4	18,480	3,140	5,371	334	0.07
Minnesota	6	50.0	3,812	108.9	3,012	0	800	0	0.01
Mississippi	1	0.0	14,693	165.2	0	0	14,693	0	0.05
Missouri	8	33.3	5,254	-1.6	4,054	1,198	2	0	0.01
Montana	6	0.0	838,120	423.1	10,232	130,832	134,973	562,083	0.90
Nebraska	4	33.3	15,665	48.3	13,955	0	1,710	0	0.03
Nevada	1	0.0	120	605.9	0	100	20	0	0.00
New Hampshire	24	-11.1	1,087,127	5.4	102,286	49,451	115,271	820,119	18.89
New Jersey	36	100.0	65,789	5.1	10,368	51,429	2,539	1,453	1.38
New Mexico	8	100.0	16,187	3.2	301	0	3,569	12,317	0.02
New York	69	11.3	125,248	76.5	31,934	17,062	41,319	34,933	0.41
North Carolina	20	33.3	35,364	15.0	6,949	2,851	2,179	23,386	0.11
North Dakota	1	0.0	3,980	*	3,980	0	0	0	0.01
Ohio	30	57.9	12,757	18.7	9,510	500	2,070	677	0.05
Oklahoma	0	*	0	*	0	0	0	0	0.00
Oregon	17	41.7	2,358	39.2	540	213	1,401	204	0.00
Pennsylvania	55	44.7	326,836	31.5	36,042	157,899	52,281	80,615	1.14
Rhode Island	29	0.0	9,999	21.9	6,633	205	2,437	723	1.48
South Carolina	12	50.0	47,484	321.3	3,393	38,103	5,733	256	0.25
South Dakota	0	-100.0	0	-100.0	0	0	0	0	0.00
Tennessee	14	55.6	18,928	34.0	5,877	630	2,525	9,896	0.07
Texas	12	20.0	7,115	-28.0	1,110	165	4,566	1,275	0.00
Utah	4	*	922	*	10	12	900	0	0.00
Vermont	28	40.0	91,155	87.9	11,111	8,685	62,728	8,631	1.54
Virginia	14	27.3	105,628	50.5	12,285	3,518	89,825	0	0.42
Washington	34	30.8	22,586	38.7	7,612	1,737	8,939	4,298	0.05
Wisconsin	27	42.1	12,990	60.8	7,462	3,739	1,356	433	0.04
West Virginia	2	0.0	0	-100.0	0	0	0	0	0.00
Wyoming	2	0.0	7,504	22.3	1,761	85	5,658	0	0.01
District of Columbia	4	300.0	294	2,572.7	56	65	173	0	n.a.
Puerto Rico	1	0.0	13,227	132.1	1,716	0	209	11,302	n.a.
U.S. total	1,145	30.0	4,044,339	49.1	606,778	890,544	772,296	1,774,722	0.18

Note: Regional totals are presented in the summary table on page iv. n.a. = not available. * = Land trusts or acres protected were 0 in 1990.
¹Acres reported by location of land trust (not necessarily by location of acreage). Some acreage may be protected by more than one land trust. ²"Transferred" refers to acreage acquired and transferred to a third party for conservation purposes. "Other" includes management agreements, negotiation, and other means. Source: Land Trust Alliance.

While land trusts are generally local in origin and focus, similar land transaction activities are carried out by a number of national nonprofit conservation organizations as well. Foremost among these is The Nature Conservancy, which has protected over 8 million acres of land in North America over the past four decades, including 585,000 acres under conservation easement (Wiebe, 1995). The Nature Conservancy focuses specifically on the preservation of biodiversity; other groups such as the National Audubon Society and the American Farmland Trust have their own special interests as well.

Transactions

Due to characteristics specific to individual landowners, public agencies, nonprofits, and parcels of land, conservation easements require case-by-case negotiation, appraisal, monitoring, and enforcement. Each easement is individually negotiated and tailored to the particular circumstances of the two parties and of the parcel of land in question. In this section, we provide an overview of the complex steps involved in the decentralized markets in which conservation easements and other partial interests in land are usually transferred.

Brokerage

The conveyance of a conservation easement requires a convergence of goals between a landowner and an organization interested in seeing that land is used at some level less than its highest intensity. In many cases, this convergence arises in response to a particular sequence of events in a particular location, such as the prospect of a new residential development in an environmentally sensitive area. Many of the smaller land trusts, for example, evolved to counter a particular land conversion project, and had as their principal or sole objective the preservation of a specific parcel of land. In other cases, a nonprofit or government agency may be interested in broader objectives, such as the maintenance of water quality on a watershed basis or the preservation of biodiversity on a national scale.

In either case, a number of services are required before an easement can be conveyed. Suitable parcels must be identified in relation to specific conservation objectives. There is as yet no widespread public dissemination of the details of conservation easements. Of course, easements are recorded in State and county

offices like other real estate transactions. In this sense, the details are public information, but that information is not readily available the way organized market prices are. In the case of easements, the widespread dissemination of price information would facilitate the price negotiation process.

Likewise, there is as yet no widespread, public dissemination of the details of individual CRP contracts or WRP easements. Government agencies do provide information on program participation and average contract values (see, for example, Osborn, 1994b), but it is distributed to inform potential participants and policymakers, not to facilitate secondary trading in these contracts.

Negotiation, Appraisal, Settlement, and Recording

Once an appropriate parcel has been identified and the relevant parties have agreed to discuss terms, a number of complex steps remain. Ownership of all interests in selected parcels must be clearly established. A baseline survey of the condition of the property should be conducted, and specific provisions to accomplish desired conservation objectives must be drafted into the easement (Diehl and Barrett, 1988). Many conservation easements restrict particular uses that are deemed incompatible with the easement's conservation purposes, but reserve all other uses to the landowner. Some critics argue that such easements are vulnerable to violations, since incompatible uses that are unanticipated at the time of easement conveyance may become feasible for the landowner in the future. An example cited by the Forest Service involves the installation of large satellite dishes to improve television reception on easement-encumbered land along a Wild and Scenic River administered by the Forest Service. Such satellite dishes were unforeseen and thus not prohibited at the time the scenic easements were drafted in the 1970's, but incompatible with the purposes for which the easements were acquired (Snow, 1992). Snow and others have suggested increased reliance on the use of "reserved-interest" easements, which convey to the easement holder all rights and interests except those specifically reserved by the landowner. Reserved-interest easements can be drafted to allow landowners to continue to use their land in ways they wish, while reducing the risk of unanticipated future uses by giving control over such uses to the easement holder. In fact, as noted earlier, the easements acquired in the Wetlands Reserve Program are reserved-interest easements.

Although easements are necessarily parcel-specific by nature, the benefits of organized trading and liquid markets derive from the use of standardized, generic contracts (Houthakker, 1969). The tradeoff is between specialized contracts that exactly meet each participant's requirements and standardized contracts that allow low transaction costs and liquid markets. A particular easement agreement may be a perfect fit for the two parties, but the transaction costs are generally high. Standardized easement formats (but not necessarily terms) can reduce the costs and time needed to negotiate an easement. The Land Trust Alliance's annual National Rally is one forum in which draft easement contracts are circulated. The primary goal of circulating sample easement contracts may be to educate new members of land trusts on the technical intricacies of easement drafting, but a concomitant benefit is standardization of easement formats.

Once specific easement provisions are agreed upon, an appraisal must be conducted to determine the value of the property before and after conveyance of the easement. The appraisal determines the fair market value of the easement, and is necessary to establish the purchase price (in the case of a fair-market-value sale) or the magnitude of income or estate tax deductions (in the case of a bargain sale or donation). Specific guidelines that Federal agencies must follow are outlined in *Uniform Appraisal Standards for Federal Land Acquisitions*, as revised by the Interagency Land Acquisition Conference (1992). These guidelines call for appraisal of the value of the underlying land in its highest and best uses before and after conveyance of the conservation easement. It is critical that nonprofit organizations seeking to work with Federal agencies be aware of these guidelines.

The landowner, the party acquiring the easement, and their legal and financial advisors must also consider alternative conveyance strategies. After selecting a conveyance strategy and arranging compensation, the final (and critical) step in the conveyance of the easement is to record the easement in the office of the local recorder of deeds.

Monitoring and Enforcement

Although an easement has been conveyed and recorded, it will not be effective in the long run without ongoing attention on the part of the easement holder.

This involves periodic monitoring of the property, ensuring that heirs or subsequent landowners are fully informed as to the existence and implications of the easement, and, if necessary, enforcement actions against a landowner who has violated an easement. Enforcement costs can be substantial, depending on landowner challenges and on the way in which the easement was drafted, and may in some cases outweigh the savings realized by acquisition of less-than-fee interest in the first place. When considering policy alternatives, it is essential that policymakers and administrators of easement-acquisition programs include the potential long-term costs of monitoring and enforcing easements, and not limit cost comparisons with fee acquisition to initial easement acquisition costs alone.

Secondary Trading

Secondary trading refers to the trading of assets after they are first created and conveyed. Most trading on the New York Stock Exchange, for example, is secondary trading. Conservation easements, on the other hand, do not frequently change hands once they are acquired by a nonprofit or public agency. A land trust might decide that its conservation goals would be better served by altering its portfolio of easements, and it might wish to sell easements in one location in order to acquire easements in another. Conservation easements are occasionally transferred, usually to another conservation organization or public agency, but such interests are generally transferred via individually negotiated contracts rather than in organized markets. (Examples of such partnerships follow.)

Properties encumbered by conservation easements are also sold, and the frequency of such transactions may rise as the use of conservation easements increases. The sale of easement-encumbered land is perhaps most common in the case of preserved farmland or open space, where the residual interests remain sufficiently attractive to individual users—for example, for agriculture or limited residential purposes. In Lancaster County, Pennsylvania, for example, seven easement-encumbered farms were sold in 1995, for an average price of \$4,960 per acre (LCAPB, 1996). The average price of all 112 farms sold in the county in 1995 was \$5,613 per acre. Land subject to CRP contracts or WRP easements may also change hands, though generally as part of a larger operating farm rather than as a preserved parcel alone.

Perpetuity

While most conservation easements are binding in perpetuity, perpetual easements have become common only in recent decades. On the broadest level, the durability of a perpetual conservation easement will depend on the long-term resolve and financial resources of the easement holder (who is responsible for enforcing easement provisions), as well as on the constancy of the legal system. In practice, it is unclear how well perpetual easements will stand up over time to legal challenges and the financial demands of monitoring and enforcement, particularly as landowners who voluntarily conveyed easements (whether through sale or donation) are replaced by subsequent owners who may be less inclined to abide by easement restrictions.

The restrictive capacity of an easement may be terminated through a variety of legal means, including eminent domain (if the government decides a property is needed for some other public purpose). Alternatively, if conditions on adjacent or other land have changed in such a way that the easement restrictions no longer serve their original purpose, the property owner may be permitted to prevent enforcement of the restrictions (Ginsberg, 1988). This might be the case, for example, if a property had been restricted to provide habitat for a migratory species that subsequently became extinct because of habitat loss elsewhere.

Some easements may also be terminated, or bought back by the landowner, at the mutual consent of the landowner and the easement holder. Farmland preservation programs in Maryland and Pennsylvania include such provisions (Daniels, 1994), as does the WRP (16 USC 3837). In other easements this option, called merger, is explicitly prohibited. An easement might also be terminated if an easement holder fails to bring an enforcement action against a violator within a certain period of time (Ginsberg, 1988).

In general, these alternatives reinforce the point that the market value, legal strength, and environmental impact of conservation easements will vary from case to case according to the particular characteristics of the property and the specific provisions of the easement itself.

Partnerships

Partial interests in land may offer the advantage of balancing public and private interests in land at less

cost than fee acquisition and with less potential for legal or political challenges than regulatory mechanisms. As we have seen, however, the price at which these advantages are acquired is that they require case-by-case negotiation, appraisal, monitoring, and enforcement, all potentially costly activities.

Federal, State, and local government agencies may be able to reduce these transactions costs by enlisting nonprofit conservation groups as partners in acquiring, managing, and monitoring easements. Nonprofit groups such as land trusts offer flexibility and agility, the ability to mobilize private financial and political support, and the capacity to provide local knowledge and insights. Local knowledge and support may also be acquired through the participation of organizations such as soil and water conservation districts.

Public and private nonprofit organizations working in partnership also offer access to a larger pool of landowners potentially willing to convey conservation easements. Public easement-acquisition programs reach a wide range of landowners, regardless of their ability to benefit from tax incentives, but such programs are limited by the availability of public funding. While qualified nonprofit organizations can offer tax advantages in exchange for easement donations, public programs generally require that easements be acquired at fair market value (or at least, as in the case of the WRP, that landowners be *offered* fair market value). For example, the implementing regulations of the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 require Federal agencies to offer not less than fair market value when they seek to acquire land (U.S. GAO, June 1994). Neither CRP nor WRP are required to *pay* full fair market value for the partial interests they acquire, however (Buland, 1995), and landowners may increase their chances of selection to participate by offering to accept less than fair market value. Nonprofit programs surmount the funding constraint by emphasizing the tax advantages of easement donation or bargain sale, but may be unable to attract landowners for whom tax benefits are insufficient. The two approaches together may attract a larger pool of interested landowners than either approach can alone.

These two potential advantages—cost savings and an expanded pool of interested landowners—justify a closer look at the role of partnerships between Federal agencies and nonprofit organizations in resource conservation policy. Four Federal agencies administer

619 million of the 650 million acres owned by the Federal Government (U.S. General Services Administration, 1995): the Forest Service (184 million acres), the Bureau of Land Management (BLM) (271 million acres), the Fish and Wildlife Service (FWS) (90 million acres), and the National Park Service (NPS) (73 million acres). In fiscal year 1994, land acquisition funding under the Land and Water Conservation Fund totalled \$254 million for the Forest Service, BLM, FWS, and NPS—down 10 percent from a year earlier (*Common Ground*, November/December 1993). Continuing budget pressures make it likely that funding for Federal land acquisition will remain tightly constrained in coming years. This reality, combined with concerns about balancing land-related resource conservation and private property rights, makes it especially important to consider the role of partnerships in conservation easement acquisition.

Nonprofit organizations play an active role in acquiring land and partial interests in land for the Forest Service, BLM, FWS, and NPS. Land trusts and other nonprofit groups increasingly perform a brokerage function with regard to conservation easements, both in transactions between private parties and in transactions involving private parties and government agencies. The Forest Service and FWS, for example, often rely on nonprofit organizations to help negotiate or acquire and transfer interests in land for conservation purposes. In the WRP, land trusts may participate in easement monitoring and management, and may acquire residual interests from landowners, but are effectively precluded from a brokerage function by program rules that prohibit enrollment of land that has been sold within the past 12 months (Arnold, 1993).

Partnerships between Federal agencies and conservation organizations have already been successful in a variety of contexts. For example, WRP regulations provide that NRCS can delegate wetland management and monitoring responsibilities to qualified private organizations (Arnold, 1993; *Federal Register*, 1995b). The Farm Service Agency (FSA) (including the former Farmers' Home Administration) seeks land trusts' help in educating farmers about FSA's program to reduce debts in exchange for conservation easements, and in monitoring those easements (*Land Exchange*, Spring 1994). The White House noted the achievements of land trusts in the 1996 *Economic Report of the President* (Council of Economic Advisers, 1996). The administration's Interagency

Floodplain Management Review Committee (IFMRC) recognized the role of nonprofits in acquiring land interests after the Midwestern floods of 1993 (IFMRC, 1994; see box 3). The Nature Conservancy, for example, helped negotiate floodplain easements and even acquired residual rights from Missouri farmers who had placed their farms in Federal wetland reserve programs (Tenenbaum, 1994), and numerous Federal, State, local, and private organizations are working together to restore a mix of floodplain-sensitive land uses in the Iowa River Corridor Project. The Forest Service and BLM are also seeking to work more closely with land trusts in activities relating to land acquisition and management (USDA, Forest Service, 1994; *LTA Landscape*, 1993; see box 4). With increased understanding of the nature of easements and the role of nonprofit conservation groups, the scope for partnerships in conservation will also increase.

Forest Service officials caution that land trusts must be well informed of Federal standards and practices regarding appraisal and land acquisition, such as the guidelines in *Uniform Appraisal Standards for Federal Land Acquisitions* (Interagency Land Acquisition Conference, 1992), and must work closely with the Federal Government from the beginning of any easement acquisition process if such partnerships are to be successful (Sherman, 1995).

Two recent reports have examined the role of nonprofit organizations in Federal land acquisition. An audit in May 1992 by the Office of Inspector General at the Department of the Interior found that between 1986 and 1991 BLM, FWS, and NPS spent \$222 million (about 22 percent of their land acquisition expenditures) on properties involving nonprofit organizations (U.S. Dept. of the Interior, Office of Inspector General (OIG), 1992, as summarized in U.S. GAO, June 1994). That report found that Interior agencies generally paid nonprofit organizations the appraised fair market value of the land acquired, resulting in financial gains to the nonprofit organizations in some cases (for example, when they had originally acquired the land for less than fair market value). Interior's Assistant Secretaries for Land and Minerals Management and for Fish and Wildlife and Parks disagreed with the Office of Inspector General's conclusion that these gains were unduly large, prompting debate about the appropriate role of nonprofit organizations in Federal land acquisition.

In 1994, the General Accounting Office (GAO) issued a second report on the role of nonprofit organizations,

Box 4—USDA’s Forest Legacy Program

Recognizing that the majority of the Nation’s productive forest lands are privately owned, and that private landowners face increasing pressures to convert their forest lands to other uses, the 1990 Farm Bill established the Forest Legacy Program to help private landowners maintain forest lands in traditional forest uses, including the production of forest products and the provision of wildlife habitat and recreational opportunities (USDA, Forest Service, 1992). New York, New Hampshire, Vermont, Maine, and Washington are the first States to participate.

In cooperation with State, local, and private agencies, the Secretary of Agriculture is authorized to acquire perpetual interests in land, especially conservation easements, from willing landowners. Implementation guidelines specifically authorize use of the services of land trusts in identifying and assessing areas for inclusion in the Forest Legacy Program. Land trusts may not execute contracts for acquisition of interests in land on behalf of the Federal Government, but they may mediate Federal easement acquisition, monitor federally held easements, and count their own easements toward the non-Federal cost-share contribution required for Federal participation.

which focused on land acquisitions by the Forest Service and the Department of Energy (U.S. GAO, June 1994). In contrast to the Interior study, GAO found that the Government’s interests were adequately safeguarded in both cases. Between 1988 and 1992, the Forest Service’s land acquisitions totaled about \$337 million, of which about 41 percent was spent on acquisitions involving nonprofit organizations (U.S. GAO, June 1994). A total of 249 acquisitions involved nonprofit organizations over the 5-year period, all but three of them made by the Forest Service. Six nonprofit organizations (the Trust for Public Land, The Nature Conservancy, The Conservation Fund, the Rocky Mountain Elk Foundation, the River Network, and the American Land Conservancy) accounted for over 95 percent of acres sold and value transferred (U.S. GAO, June 1994). In most transactions, the Federal agencies based their offers on fair market value as determined by timely appraisals. Even in cases where nonprofit organizations sold land to the Government for more than they paid for it (as when nonprofit organizations acquired land at less than fair market value), the nonprofit organizations were found to incur net losses when all direct and indirect costs associated with land acquisition and transfer were considered. The GAO report concluded that Forest Service and Department of Energy relationships with nonprofit organizations have been positive, allowing the Federal Government to take advantage of opportunities to acquire desirable properties that might otherwise have been missed due to landowner unwillingness to deal directly with Federal agencies or to agencies’ inability to act sufficiently quickly.

Mitigation Banking

In general, the importance of case-specific circumstances will continue to make decentralized trading the most reasonable market structure in most easement situations. However, features of more centralized markets have begun to appear with the emergence of mitigation banking in a variety of resource conservation policy contexts.

Mitigation

Mitigation involves the compensatory creation or restoration of substitute land with particular environmental characteristics, such as wetlands, to make up for unavoidable losses of environmentally sensitive land due to agricultural conversion or development. Some regulatory programs, such as Section 404 of the Clean Water Act, require compensatory mitigation if wetland losses cannot be avoided or sufficiently minimized. The swampbuster provisions of the 1985 Farm Bill, which deny farm program benefits to farmers who convert wetlands or produce a crop on wetlands converted after December 1985, allow continued program participation if the wetland loss is mitigated through restoration of a prior-converted wetland in the same general area of the local watershed (16 USC 3822).

Compensatory wetland mitigation has historically required creation, restoration, or enhancement of replacement wetlands on or adjacent to the site of the wetland conversion (Environmental Law Institute,

1993). This on-site, project-specific focus has tended to result in small-scale, high-cost compensatory wetlands yielding poor ecological benefits in areas that may not reflect broader wetland priorities. Concern about these results has led to the emergence of an alternative mitigation approach over the last decade: wetland mitigation banking.

Wetland Mitigation Banking

Wetland mitigation banking involves a centralized mitigation function carried out by an approved mitigation agency that may or may not be involved in wetland conversion itself. The bank works on the principle of “compensation credits” that are acquired by public works agencies, private developers, or other parties that need to convert wetlands for various purposes. Rather than mitigating on-site, these parties can purchase and “bank” compensation credits in a larger, centralized wetland mitigation project. The wetland mitigation bank itself may be operated for the exclusive use of a particular developer or public agency, or it may also serve other parties, or it may be altogether independent of conversion activities.

The Environmental Law Institute (ELI) identified 46 existing wetland mitigation banks in the United States as of July 31, 1992 (ELI, 1993). Banks were located in 17 States, but concentrated in California (with 11 banks) and Florida (with 8). Nearly 75 percent of the 46 banks were operated by State highway departments, port authorities, or local governments to provide mitigation for public works projects. Six more banks were controlled by private developers for advance mitigation of their own projects. Only four banks offered compensation credits for commercial sale to the general public, one of them a privately owned bank and the other three owned by public agencies or nonprofit organizations.

ELI also identified 64 proposed mitigation banks at various stages of review and authorization. Of the 64, 32 propose to offer credits for commercial sale to the

general public, in contrast with 9 percent of existing banks.

On November 28, 1995, NRCS and other Federal agencies published final policy guidance for the establishment, use, and operation of mitigation banks to satisfy the wetland mitigation requirements of the Clean Water Act’s Section 404 permit program and the “swampbuster” provisions of the 1985 Food Security Act (*Federal Register*, 1995a). The guidelines state that banks may be sited on public or private lands, but that mitigation credits may not be generated by federally funded wetland conservation projects such as the WRP or the Fish and Wildlife Service’s Partners for Wildlife Program.

Preservation of existing wetlands may not generally be used as the sole basis for generating credits. The guidelines state the agencies’ preference for mitigation within the same geographic area and of the same kind of wetland as that being degraded or lost. Compensatory mitigation is to be assured prior to any debiting of mitigation credits from the bank. Finally, wetlands created, restored, or enhanced by the mitigation bank are to be protected in perpetuity with appropriate real estate arrangements, such as conservation easements or transfer of title to an appropriate Federal or State agency or to a nonprofit conservation organization.

Mitigation banking schemes essentially make transferable a developer’s obligation to mitigate when wetland losses are unavoidable. In so doing, they offer potential advantages of a wider market in conservation interests. Specifically, mitigation banking schemes can realize economies of scale in wetland creation, restoration, or enhancement, as well as flexibility in locating compensatory wetlands in sites that offer greater or higher priority ecological benefits. Given the relatively recent emergence of wetland mitigation banking, it remains to be seen whether this will prove a viable market institution over time, and whether it might eventually prove promising in other conservation contexts as well.

Valuation of Partial Interests in Land

This section focuses on the valuation of partial interests in land, particularly conservation easements. Given inactive markets for partial interests themselves, valuation of partial interests requires analysis of markets for underlying properties. The value of the partial interest must then be estimated indirectly as the difference between the value of the underlying property with and without the partial interest in question. As such, valuation of partial interests sheds light on property rights proposals currently being considered by Congress, which define compensation in terms of the value of a property with and without a particular Federal action.

Like gold or securities, land is an asset. As such, land is distinguished from immediate consumption goods by the fact that ownership provides benefits over an extended period of time. The value of an asset like land is based on expectations about the stream of benefits that ownership will provide over time. When we speak of value, we often think first of the value placed on an asset by the market—the “fair market value.” When we consider the decision of an individual to acquire or convey a partial interest in land, however, we must consider the after-tax value of the partial interest given the tax status of that particular individual. And when we consider the decision of a government agency or nonprofit organization to acquire or convey a partial interest, we must consider the value to society of the rights thereby established or relinquished. Government agencies or nonprofit organizations must pay the landowner enough to compensate for the rights the landowner is relinquishing, but they should not pay more than the results are worth to society.

None of these values are easily determined, since there does not yet exist an active market in conservation easements, since future costs and benefits are not known with certainty, since tax situations are complex and varied, and since social values generally depend on nonmarket factors. Nevertheless, approximations are possible, and it is on these approximations that easement values are typically based. In what follows, we will consider first the fair market values of partial interests in land; second, the after-tax values by which individuals decide whether to acquire, hold, donate, or sell partial interests in land; and third, the social values by which government agencies or nonprofit organizations decide whether to acquire, hold, or transfer partial interests in land. Finally, we take a second

look at the valuation of partial interests in the case studies already introduced: farmland protection easements, CRP contracts, and WRP easements.

Fair Market Value

In general, a property’s fair market value is the price at which the property would change hands between well-informed and willing buyers and sellers who are not under compulsion to buy or sell. If well-functioning markets exist for partial interests in land, the fair market value of such interests can be determined as the price at which comparable interests are traded. Such may be the case for subsurface mineral rights, for example, for which there are long-established commercial precedents. In the case of conservation easements or rental contracts, on the other hand, substantial records of transactions are not generally available, except in particular situations where programs (such as the CRP, the WRP, or State and county farmland protection programs) are already active. (Even in these cases, circumstances may differ significantly from one easement to the next, making it difficult to find truly comparable cases.) In the absence of active markets for easements, the fair market value of a conservation easement is generally estimated on the basis of “before-and-after” comparisons of the fair market value of the underlying land.

Before-and-After Comparisons

Before-and-after comparisons assume that markets for land are more active than markets for particular partial interests in land. Specifically, this process involves comparing the fair market value of the underlying land with and without the restrictions imposed by the conservation easement (Interagency Land Acquisition Conference, 1992). The fair market values of the land before and after an easement is granted are based on the “highest and best” uses of the land with and without the restrictions imposed by the easement.

Highest and Best Use

Economic theory suggests that, in a competitive market economy, potential users of a commodity will bid against each other for access to that commodity; those who plan to use it for the purpose that generates the highest expected returns will be able to outbid those who plan to use it for alternative, less profitable purposes. The appraisal literature cites four general criteria for determining highest and best use: of all uses

that are physically possible, legally permissible, and financially feasible, the highest and best use is that which affords the highest present value (Interagency Land Acquisition Conference, 1992). In the case of easement valuation, the notion of highest and best use is complicated by factors that will be considered further below.

Appraisal Methods¹⁰

Highest and best-use values before and after a property is encumbered by an easement are typically estimated using three related professional appraisal approaches, each of which has its own particular strengths and weaknesses. The first of these, the comparable sales approach, is generally considered most accurate in relation to active markets for uniform commodities (LTA & NTHP, 1990). This approach is potentially useful for appraisal of the value of a parcel of land before an easement is granted, but its usefulness in estimating the “after” value remains limited in many areas by the relative lack of comparable-sales data for properties encumbered by easements.¹¹ A second approach estimates the cost of replacing buildings and other improvements, less depreciation. This approach is of limited use in the valuation of conservation easements on unimproved land. The third approach, the income approach, is based on capitalization of the income that could be generated by land in its highest and best uses before and after encumbrance by the easement (LTA & NTHP, 1990). This approach requires information on expectations about future costs, returns, and capitalization rates; it becomes more difficult when net income or benefit streams are difficult to measure. In practice, the comparable-sales approach is generally used to estimate the land’s value before the easement is granted, and the income approach is generally used to estimate the value that the remaining (typically agricultural) use rights would have after the easement is granted.

Whichever appraisal techniques are used, the fair market value of the land before the easement is granted can be termed the unrestricted-use value of the land.

¹⁰This discussion provides an introduction to the concepts and issues involved in valuing conservation easements. Formal guidelines are presented in *Uniform Appraisal Standards for Federal Land Acquisition* (Interagency Land Acquisition Conference, 1992) and in the references cited therein.

¹¹Lancaster County, Pennsylvania, is one area that now collects and publishes such data routinely (LCAPB, 1996).

The fair market value of the land after the easement is granted can be termed the restricted-use value of the land. The fair market value of the *easement* is estimated as the difference between the unrestricted-use value of the land and the restricted-use value of the land.

Highest and Best Use Refined

Despite guidelines provided in statutes and regulations, a considerable degree of ambiguity surrounds the valuation of conservation easements. This ambiguity derives in turn from a lack of precision in determining highest and best use, both before and after restrictions are placed on the land. We noted earlier that highest and best use refers in general to that physically possible, legally permissible, and financially feasible use that affords the highest present value. In *Appraising Easements*, a respected reference in the field of land conservation, highest and best use is defined as “that reasonable and probable use that will support the highest present value for the property as of the date of the appraisal” (LTA & NTHP, 1990: 19). Both of these definitions are limited by an apparent implicit assumption that a *single* use will remain highest and best for a particular parcel of land in perpetuity. In fact, returns to alternative land uses may change over time, meaning that the use determined to be currently highest and best may itself change from one period to the next. This suggests that easement appraisals should be based on before-and-after comparison of the present value of land not under a single highest and best use, but rather under the feasible *sequence* of highest and best uses over time.¹²

Thus, we need to consider streams of expected net returns to alternative uses over time, and then determine the sequence of present and future uses that provides the highest present value as of the date of the appraisal. (Such a sequence would have to be feasible in the sense of recognizing, for example, the difficulty of reverting from urban to agricultural use as conditions change. This could be accomplished by incorporating costs of converting from one use to another.) IRS regulations do include instructions to consider “not only the current use of the property but also an objective assessment of how immediate or remote the

¹²The range of legally permissible uses may also change over time. Although efforts to anticipate zoning changes quickly become very complicated and uncertain, appraisers are required to estimate the likelihood of zoning changes (Daniels, 1994).

likelihood is that the property, absent the restriction, would in fact be developed” (26 CFR 170A-14(h)). But this consideration apparently takes the form of adjustments to a simple discount rate, rather than explicit consideration of a stream of variable returns to alternative land uses over time. The latter requires a more general form of present value estimation known as “discounted cash flow analysis” (LTA & NTHP, 1990: 28).

Consider the example of a parcel of farmland near an expanding urban area. To acquire a conservation easement on the land, an agent interested in preventing development must compete for the development rights against others who may be interested in developing the land (now or in the future). The value of the conservation easement is thus determined by the value of returns to alternative uses of the land, as reflected in the prices evident in the market for comparable properties in a given area.

Sequences of returns to competing uses will determine the property’s value; if a developer’s estimate of the profits he or she can make from subdividing the property (returns to development) exceed the farmland owner’s estimate of the land’s value in agricultural commodity production, the developer may be able to bid the land away from the farmland owner by offering him or her more than the land’s agricultural value. (In most cases, speculators and developers, with their particular skills, connections, and objectives, mediate the market between the original farmland owners and the eventual residential or commercial occupants of developed land.) Most land is held for relatively long periods so the decision for the developer and the farmland owner in this example involves estimating streams of returns over time. In making these calculations, the developer and the farmland owner must estimate returns to development and farming for as long as they plan to hold the property. Future returns to agricultural and urban uses are never known with certainty. Costs, yields, and output prices are all subject to fluctuations due to factors beyond the landowner’s control, meaning returns to land are uncertain even when uses and technologies are well established.

Uncertainty

There are many ways to deal with uncertainty. Prospective landowners could assume, naively, that

returns to alternative uses will not change over time. Alternatively, prospective landowners could assume that returns to alternative uses will change over time according to a particular pattern. Let us consider a simple example. Assume that there are equal probabilities that the returns from farming will increase or decrease from one year to the next, and that the possible changes are the same size. In period zero, net returns from agriculture are known to be \$100. In period one, net returns from agriculture can take on two values, \$110 or \$90 per acre, each with probability 0.5. Expected returns will be $0.5 \times \$110 + 0.5 \times \$90 = \$100$ per acre. In each subsequent period, returns will rise or fall by \$10 with equal probability. Eventually, in period five, net returns from agriculture will take on one of six values: \$150, \$130, \$110, \$90, \$70, or \$50 per acre, with probabilities 1/32, 5/32, 10/32, 10/32, 5/32, and 1/32, respectively. The expected level (today) of returns in period five is \$100 per acre. In fact, because of the assumptions that characterize this simple random walk, the expected level (today) of future agricultural returns remains at \$100 per acre for all periods in this example. Over a 5-year period, the expected returns to agricultural use (R_a) and their variability (measured by the standard deviation, σ_a) can be depicted as:

	t = 0	t = 1	t = 2	t = 3	t = 4	t = 5
R_a	100	100	100	100	100	100
σ_a	0.0	10.0	14.1	17.3	20.0	22.4

If the possible changes (upward and downward) are not of the same size, or the probabilities of the various changes are different, the expected level (today) of future returns will be different for each period. For example, if the probability that returns increase by 20 in any period is 1/2 and the probability that they decrease by 10 is also 1/2, expected returns (today) and their standard deviation for each period will be as follows:

	t = 0	t = 1	t = 2	t = 3	t = 4	t = 5
R_a	100	105	110	115	120	125
σ_a	0.0	15.0	21.2	26.0	30.0	33.5

Incorporating uncertainty into the process of valuing expected returns allows the landowner to explicitly account for the possibility that returns to land may change over time.¹³

An Example

Let us return to our example of a parcel of farmland near an expanding urban area. The land in our example is physically suitable for agricultural or urban use, and both uses are legally permissible and financially feasible. We need to determine what use, or sequence of uses, is financially optimal. For simplicity, assume that conversion is costless and that expected net returns are as illustrated in figure 5. In this example, expected net returns to agricultural use are constant at \$100 per acre per year (R_a). Net returns to urban use are expected to remain constant at \$50 per acre per year indefinitely (R_u). Capitalizing these streams of expected net returns at an annual rate of 5 percent yields a present value of $\$100/0.05 = \$2,000$ per acre in agricultural use and a value of $\$50/0.05 = \$1,000$ per acre in urban use. In this example, agriculture is the land’s highest and best use, it is never optimal to convert to urban use, and the fair market value of the land today is \$2,000 per acre.¹⁴ The value of a farmland preservation easement on this property would be \$0 per acre, the difference between the land’s fair market value (\$2,000 per acre) and its restricted-use value (also \$2,000 per acre).

Next, let us complicate the example by considering the impact of an announcement of plans to develop nearby land for residential and commercial use. Such development plans must be approved by State, local, and sometimes Federal authorities. Let us assume that the probability of approval for a particular development project is 50 percent, and that expected net returns to agricultural use are unaffected (figure 6). If the plans are approved, development of the nearby land will take place, and net returns to urban use of our parcel will rise to \$250 per acre per year beginning next year (R_u^{high}). If the plans are not approved, development will not take place on the nearby parcel, and net returns to urban use of our parcel will remain

Figure 5
Valuing certain returns to land

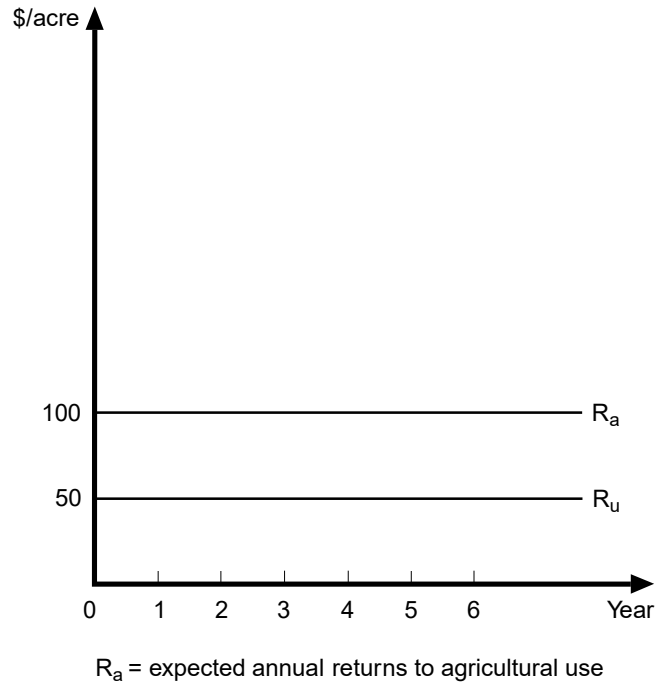
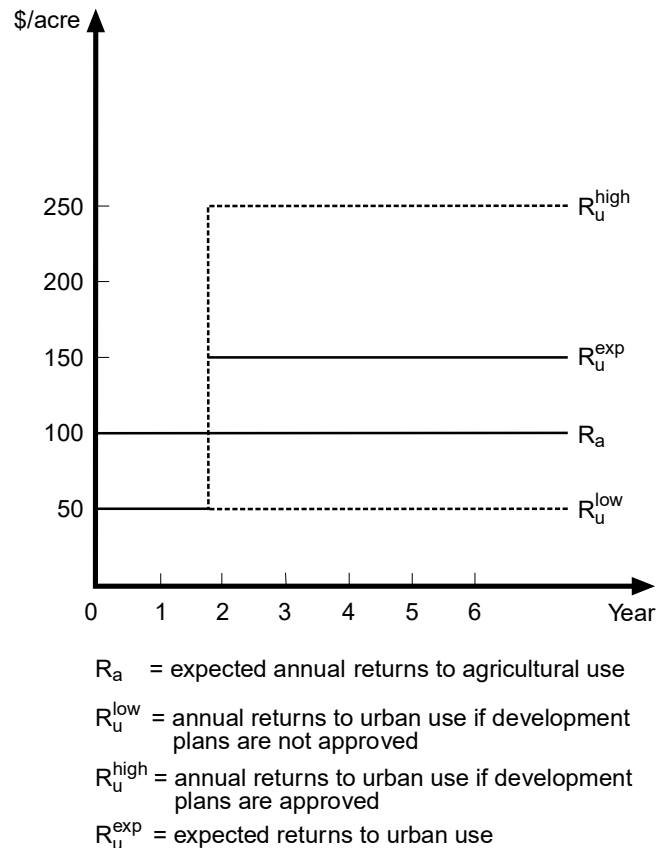


Figure 6
Valuing uncertain returns to land



¹³Although we will not do so in this paper, it is also possible to generalize to the case where returns to both agricultural and urban use follow stochastic processes (see Capozza and Li, 1994).

¹⁴We consider only a single intensity of urban use here. Other sources, such as Mischynski (1978), generalize to multiple intensities.

at \$50 per acre per year (R_u^{low}). The expected level of net returns to urban use of our parcel is $0.5 \times \$250 + 0.5 \times \$50 = \$150$ per acre per year from next year on (R_u^{exp}).

Now what is the highest and best use of this parcel? The answer depends on how returns are capitalized into present values. Simple capitalization, based on current net returns and interest rates, yields one answer. Capitalization of changing net returns to alternative single uses yields another. Capitalization of changing net returns to the optimal *sequence* of uses yields a third. A fourth alternative incorporates the value of the option of waiting for future information to become available. These distinctions are important because they give us differing estimates of the fair market value of the parcel, and thus of the value of a conservation easement on the land. They also indicate different optimal times of conversion. The four techniques are compared below; results are summarized in box 5. The equations by which these present values are estimated are presented in the appendix.

Method 1. Simple capitalization assumes current returns and interest rates persist indefinitely into the future. In our example, this approach would disregard the possible impact of adjacent development on the parcel under consideration. If current returns are capitalized at a 5-percent annual rate, such a procedure would yield a present value of $\$100/0.05 = \$2,000$ per acre for the land in agricultural use, and a present value of $\$50/0.05 = \$1,000$ per acre in urban use. This suggests that agricultural use is the highest and best, as above. Then, the fair market value of the land would be \$2,000 per acre, and it would never be optimal to convert the land to urban use. Using this method, the present value of a conservation easement permanently restricting urban use would be the fair market value minus the agricultural use value, or $\$2,000 - \$2,000 = \$0$ per acre, even though the parcel faces the possibility of imminent development pressure. This example demonstrates that it is costly to disregard information about the future, and simple capitalization is clearly inadequate when expected net returns are changing over time.

Method 2. Alternatively, if changing expected returns to alternative single uses are capitalized at a 5-percent annual rate, the present value of the land in agricultural use is \$2,000 per acre, and the present value of the land in urban use is \$2,905 per acre —

reflecting expectations of increased returns to urban use in the future. This method suggests that urban use is the highest and best, and that conversion to urban use should take place immediately. In this case, the fair market value of the land would be \$2,905 per acre, it would be optimal to convert to urban use immediately, and the present value of a conservation easement permanently restricting urban use would be $\$2,905 - \$2,000 = \$905$ per acre.

Method 3. We can improve on this estimate, however, if we consider the highest and best *sequence* of uses—that is, the sequence of uses that are expected to prove optimal in each period. Figure 6 illustrates that expected annual net returns to agricultural use exceed expected annual net returns to urban use in the first year, and that urban use generates higher expected annual net returns thereafter. Given costless conversion, the best strategy for the landowner would be to keep the land in agricultural use for the first year and then convert to urban use. The present value of the land in this optimal sequence of uses is \$2,952 per acre. In this case the fair market value of the land would be \$2,952 per acre, the optimal time to convert to urban use would be in the second year, and the present value of a conservation easement permanently restricting urban use would be $\$2,952 - \$2,000 = \$952$ per acre.

Method 4. The uncertainty surrounding the approval of the plans for development of nearby land creates an additional factor that we have not yet considered. This is the option of waiting a year—not before developing but before *deciding* whether or not to develop the parcel of land in our example—and then developing only if the adjacent development is approved and urban returns to our parcel jump to \$250 per acre per year. (If the adjacent development plan is denied, urban returns to our parcel would remain at \$50 per acre per year, and it would be optimal for the parcel to remain in agriculture, generating expected net returns of \$100 per acre per year and a present value of \$2,000 per acre.) Given first-year returns of \$100 per acre from agriculture and equal probabilities of subsequent development or continued agricultural use, the present value of this option is \$3,429 per acre. Thus, the fair market value of the land is \$3,429 per acre, and the optimal time to convert to urban use is either in the second year (if the adjacent development is approved) or not at all (if the adjacent development plan is denied). The present value today of a conser-

vation easement permanently restricting urban use is \$3,429 - \$2,000 = \$1,429 per acre.

Box 5 summarizes the assumptions on which the example is based and the resulting differences between valuation methods 1-4. Each successive method values a conservation easement on the parcel of land in our example more highly, since each incorporates a progressively more accurate recognition of the optimal sequence of returns that are expected to flow to the parcel of land. Method 1 is clearly inadequate, since it disregards the possible impact of adjacent development entirely. Method 2 recognizes this possible impact, but is limited to a comparison of alternative single uses of the parcel. Method 3 recognizes that it may not be optimal to convert the parcel for development immediately, while method 4 recog-

nizes the additional value of waiting before making a decision on conversion. Each additional factor incorporated adds to the present value today of the land before conservation restrictions are imposed (V_{B0}), and thus adds to the present value today of the conservation easement itself (V_{e0}).

Each successive method also changes the optimal time of conversion for urban use. Method 1 suggests conversion is never optimal, since it disregards information about changing returns to urban use in the future. Method 2 suggests that conversion should take place in the first year, since it requires an immediate choice between the two alternative single uses. Method 3 recognizes that the optimal stream of returns includes agricultural use in the first year, and that conversion should take place in the second year. Finally, method

Box 5—Alternative Ways to Estimate the Value of a Conservation Easement

The table below summarizes alternative ways to estimate the per-acre value of a conservation easement, as discussed in the text, based on the expected net returns illustrated in figure 6. Complete derivations are presented in the appendix.

Method 1 compares the two uses assuming that expected returns remain constant at current levels. Method 2 compares the two uses recognizing that expected urban returns change after the first year. Method 3 considers the best sequence of uses, if conversion were to take place at the optimal time. Method 4 considers the option of waiting for more information on adjacent development plans.

Definitions and assumptions

- R_{at} expected annual net returns to agricultural use (\$100 per acre every year)
- R_{ut} expected annual net returns to urban use (\$50 per acre in the first year, then \$150 per acre every year thereafter)
- i discount rate (5 percent per year, every year)
- T duration of the easement (infinite)
- V_{B0} today's per-acre value of the land before restrictions are imposed (determined below)
- V_{A0} today's per-acre value of the land after restrictions are imposed (\$2,000 per acre)
- V_{e0} today's per-acre easement value; = $V_{B0} - V_{A0}$ (determined below)
- t^* optimal time to convert from agricultural to developed use (determined below)

Results

Method	V_{B0}	V_{A0}	V_{e0}	t^*
1	\$2,000	\$2,000	\$0	never
2	\$2,905	\$2,000	\$905	1st year
3	\$2,952	\$2,000	\$952	2nd year
4	\$3,429	\$2,000	\$1,429	2nd year or not at all

4 incorporates the option of waiting to hear whether the adjacent development project has been approved; if so, conversion should take place in the second year; if not, the land should remain in agricultural use.

More generally, the value of the option of waiting for new information before deciding to convert is illustrated in figure 7. If returns to agricultural use are constant while returns to urban use are increasing, the option value of waiting until t^{**} to decide whether or not to convert (instead of converting at t^*) is displayed on the vertical axis. The implication of this result is that farmland may be converted for development too soon if this option value is not recognized.

Irreversible Investment Under Uncertainty

This line of reasoning has been extended in the theoretical literature, and is described briefly below. When land conversion is irreversible, conversion decisions are made under uncertainty, and decisions can be delayed to take advantage of new information, conversion decisions can be modeled as irreversible investments under uncertainty (Pindyck, 1991). The decision by a landowner to surrender development rights is analogous to an investment decision that meets these three criteria.

The decision is irreversible in two senses. First, land development typically involves considerable invest-

ment in infrastructure, and restoration of farmland would require even greater expenditure to clear away such infrastructure. Such expenditure is rarely justified by expected benefits from farmland restoration. And second, donated conservation easements must be granted in perpetuity in order to qualify for Federal income and estate tax benefits.¹⁵

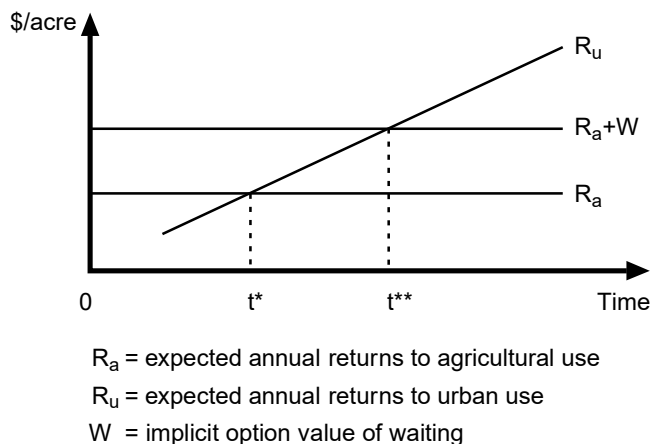
The decision to surrender development rights involves uncertainty because the economic and environmental conditions underlying future agricultural and urban returns are unknown today. Information about these conditions becomes available only gradually.

Finally, the decision to surrender development rights can be delayed, if the landowner wishes, in order to take advantage of new information about changing economic and environmental conditions. The landowner may decide to sell development rights at any time. (In practice, however, the landowner may not find a willing buyer with available funds at any time. The Lancaster County Agricultural Preserve Board, for example, currently has a waiting list of 5-10 years—Daniels, 1994.)

When these three criteria are met, it may be to the landowner's advantage to delay the decision to surrender development rights. The decision is said to entail an implicit option for the value of waiting. This approach has been developed in the economics literature by Dixit and Pindyck (1994) and others, and in the financial literature by Sick (1989). In the latter, the approach is called real option theory and has been applied to farmland conversion decisions by Capozza and Sick (1994).

In this section, we have considered the role of uncertainty in the estimation of returns to alternative uses of land, and have shown that the value of conservation easements may increase as more information becomes available and as restrictive assumptions are relaxed. While the specific values compared depend on the parameters of our particular example, the general lesson to be learned is that valuation of partial

Figure 7
Optimal time of conversion



¹⁵The use of conservation easements is relatively new, and the definition of perpetuity has not yet been seriously challenged. Easement programs sometimes offer buy-back opportunities if, after a number of years, the purposes for which the easement was established can no longer reasonably be accomplished. Government agencies can also condemn land subject to an easement in order to further other public purposes, such as road construction (Daniels, 1994), as discussed earlier.

interests in land, particularly in the absence of active markets for those partial interests, is a complex and difficult task.

After-Tax Value

The fair market value of a partial interest in land is the value at which an interest could be bought or sold on the market. Whether or not a particular landowner decides to hold onto a property's development rights, or to convey them via donation or sale to a nonprofit organization or government agency, depends on how much of this fair market value is actually realized by the landowner and his or her heirs after a variety of taxes have been considered. Income, estate, and property taxes vary with the particular circumstances of individual landowners, and are discussed in turn below.

Income Taxes

The Federal Government has long used the tax code to provide incentives for individual behavior consistent with public objectives, including environmental protection. It is only relatively recently that conservation easements have been explicitly treated in the tax code. In calculating income for Federal income tax purposes, deduction of the value of certain donated partial interests in land was first permitted by an IRS ruling in 1964 and the Tax Reform Act of 1969 (Powell, 1989). The Tax Reform Act of 1976 and subsequent amendments provided, for the first time, express statutory authority enabling taxpayers to claim deductions for charitable contributions of conservation easements to government agencies or qualifying nonprofit organizations (Small, 1990).

The Federal tax consequences of conservation easement donation are spelled out in statute (26 USC 170) and IRS regulations (26 CFR 1.170A). If the easement meets certain criteria established by the IRS, the donor may claim the value of the donation (or of the difference between the easement's fair market value and its bargain sale price) as a deduction on his or her Federal income tax return. To meet the criteria, the easement must incorporate perpetual restrictions for qualified conservation purposes, and it must be donated to an organization with the commitment and resources to enforce the restrictions over time. Qualified conservation purposes include the preservation of land with significant public benefits in terms of outdoor recreation and education, habitat, open space, or historical importance (26 CFR 1.170A-14).

The full value of conservation easement donations that meet these criteria can be deducted from an individual's income in the year in which the donation was made, as long as the deduction does not exceed 30 percent of the individual's adjusted gross income. If the value of the donation exceeds 30 percent of the donor's income, the deduction can be carried over, subject to the same limit, for up to 5 additional years.

With regard to income taxes, capital gains may be a particularly important consideration. When land is sold, the increase in value (over the base value the property had when first acquired by the landowner) is treated as a capital gain. On undeveloped land that has been held for a long time in proximity to a growing urban area, the increase may be due largely to development pressure, and it may be substantial.

Estate Taxes

Under current tax law, the full fair market value of estates exceeding \$600,000 is taxable at rates of up to 55 percent, generally payable by the heirs within 9 months after the decedent's death. Like the income tax code, however, the estate tax code has been modified to influence the behavior of individuals, including landowners, to accomplish public purposes. The fair market value of a perpetual conservation easement that is donated to a qualified nonprofit organization or government agency, or the difference between the fair market value and the (bargain) price at which a perpetual conservation easement is sold, can be excluded from the value of a decedent's estate for Federal estate tax purposes. This is true whether the easement was donated during the landowner's lifetime or donated by will at death. Legislative proposals introduced in recent sessions of Congress would further exclude the value of the residual rights retained in the estate on certain easement-encumbered land, such as land within 50 miles of metropolitan areas that is facing significant development pressure.

Without an easement, land is valued at its full, unrestricted fair market value for estate tax purposes unless it qualifies for use-value assessment under the conditions of the Federal tax code (which are not the same as the State and local use-value assessment criteria for property tax purposes discussed below and in the section on farmland protection in "Partial Interests in Three Policy Settings"). To qualify for use-value assessment for estate tax purposes, Federal tax law requires that the decedent must have materially partic-

ipated in farming the land for at least 5 of the 8 years prior to his or her death, and that the heirs must continue farming the land for at least 10 subsequent years (26 CFR 2032A).

Property Taxes

To the extent that an easement represents permanent restrictions on how a parcel of land can be used, it reduces the fair market value of that parcel of land. Nevertheless, assessment of value for property tax purposes is the responsibility of local assessors, and they may vary in their consideration of such value changes. As a result, conveyance of a conservation easement may not result in reduced property taxes in all cases. In fact, this has been a major concern of farmland owners participating in the WRP (Soil and Water Conservation Society, 1994).¹⁶

Farmland owners are concerned because when an easement is sold at its fair market value, as in the case of the WRP, the landowner's wealth has not declined, but the share of that wealth represented by real property has declined. Landowners argue that the real property portion represented by the value of the easement has been extinguished and is no longer subject to property taxation, just as the right to use the land more intensively was extinguished by the easement itself. Not all assessors agree (Stockford, 1990). An argument might be made that the government agency or nonprofit organization that acquired the easement should be liable for property tax payments. The Federal Government makes payments in lieu of taxes to compensate local jurisdictions for loss of property tax revenue, but only where the Federal Government owns land in fee (U.S. Dept. of the Interior, BLM, 1995; Buland, 1995). These payments total about \$100 million per year (U.S. Dept. of the Interior, BLM, 1994).

In the case of farmland protection, since all 50 States currently have use-value assessment programs in place, much farmland may already be assessed at less than its full, unrestricted value. Participating farms would already be paying property taxes based on the restricted-use value of the land, and conveyance of a farmland protection easement would likely have no further effect on their property tax assessment.

¹⁶The South Dakota Supreme Court has upheld several landowner challenges to local assessors over property tax assessments. As a result, cropland entering WRP in South Dakota will be valued, for property tax purposes, at most of its hayland or grassland value (Buland, 1995).

Implications for Landowner Decisionmaking

The cumulative effects of income, estate, and property taxes are an important consideration in any prospective transfer of a partial interest in land. Stephen Small, an attorney who specializes in estate planning, points out that most landowners do not want to deal with the complexities of conservation easements or estate planning until compelled to do so by the realization that their heirs may be forced to sell all or part of a family's property in order to pay estate taxes (Small, 1992). In combination with income tax benefits, estate planning provides a powerful incentive for some landowners to donate a conservation easement (or sell it at a bargain price) to a qualified organization.

Social Value

Social value is a third dimension of value that must be considered in relation to partial interests in land. While fair market value represents that price at which an interest is expected to change hands between willing buyers and sellers in a well-functioning market, and after-tax values reflect the differing net returns realized by sellers in different financial circumstances, social value reflects the benefits to society from acquisition of a particular interest in land. Just as a landowner considers after-tax values in deciding whether or how to convey an easement, a government agency or nonprofit organization must consider the easement's social value relative to its market value in deciding whether or how to acquire that easement. (In general, it is the market value of the interest acquired, not the interest's value to the acquiring agency, that is to be considered in appraising the interest, but clearly the interest's value to the agency must match or exceed the interest's market value before the agency can justify acquiring it.)

For example, once a farmland protection easement is priced (based on the difference between privately available returns to compatible uses and foregone returns to development), the interested public agency or nonprofit organization needs to determine whether the easement is worth acquiring. Similarly, once a wetland easement is priced (based on the difference between privately available returns to wetlands-compatible uses and foregone returns to farming), the interested public agency or nonprofit organization needs to determine whether the easement is worth acquiring.

Estimates of the social value of habitat, ecological, or other services are relevant in making this determination. In general, however, these services are considered social precisely because they are nonmarket in nature. As a result, estimates of such values are difficult to derive, and range widely with the particular function, specific type of land or wetland, and geographic location of a property. Various valuation methods (such as contingent valuation) have been developed for this purpose, but will not be described further here. (See, for example, Mitchell and Carson, 1989).

Case Studies Revisited

In this section, we take a brief second look, in light of our discussion of fair-market, after-tax, and social values, at the partial interests described in the case studies of “Partial Interests in Three Policy Settings.”

Farmland Protection Easements

Farmland protection easements were the subject of our earlier fair market valuation example. At this point, we simply note that the decisions of individual landowners to participate in nonprofit or public farmland protection programs will depend on how fair market value compares with after-tax values in each particular case. The decisions of individual organizations to acquire particular easements will depend on how fair market value compares with social values in each particular case.

Conservation Reserve Program Contracts

The valuation procedure implemented in the CRP differs from the one we described earlier in that it does not fully consider the residual value of land rights held by the landowner after the CRP contract has been signed. As defined earlier, the fair market value of the partial interest acquired is based on the difference between returns to soil conservation-compatible uses and foregone returns to farming, where the latter is the fair market rental value of the land unencumbered by the CRP contract. (This assumes that there is no development pressure, which may not always be the case.) Estimates of the rental value of retired cropland in soil conservation-compatible uses can only be based on returns that are likely to be available to private landowners. Estimates of such rental values presented above range from \$5 per acre to \$28 per acre

for hunting (Williams, 1991). Depending on how CRP contracts are revised for future signups, other possible sources of market returns to participating landowners might include haying, grazing, or subsurface mineral rights. In practice, however, residual returns to activities such as hunting or birdwatching are difficult to measure and typically small in relation to agricultural returns, so the capitalized value of comparable cropland rental rates may be a reasonable approximation.

Wetlands Reserve Program Easements

As in the case of the CRP, the value of the WRP easement should be based on the difference between returns to wetlands-compatible uses and foregone returns to farming—in this case, the fair market value of the land unencumbered by an easement. (Again, we assume that there is no development pressure, although this clearly would not be the case for WRP acreage on Long Island or in parts of California.) The distinction in the case of the WRP is that this difference is calculated in perpetuity instead of over 10 years, as in the case of the CRP. The perpetual term of WRP easements to date suggests that the pricing procedure may be similar to the farmland protection case we developed earlier. The wetlands case is complicated because residual wetlands-compatible uses are more likely to be nonmarket or social in nature than are the residual agricultural uses considered in the farmland protection example, and thus more difficult to value. To illustrate this difficulty, table 6 presents a wide range of estimates of social and market values for various wetland functions and types.

While the social values of wetlands may be significant, the discussion earlier demonstrates that the fair market value of wetlands after they are encumbered by an easement is based on the value of market services, since these represent the returns that are likely to be available to private wetland owners. Estimates of the market values presented in table 6 range widely, from less than \$10 per acre to more than \$10,000 per acre. Other possible sources of market returns on land encumbered by a WRP easement might be haying, grazing, recreation, or subsurface mineral rights, provided they are compatible with the terms of the WRP easement. The wide range of values illustrates the difficulties inherent in valuing wetlands and wetland functions, even for a single wetland type and location, let alone on a programmatic basis.

Table 6—Illustrative wetland functions and estimated values

Function	State and wetland type	Value
		<i>\$/acre</i>
Social values:		
Fish and wildlife habitat—		
Mammal/reptile	Louisiana coastal	12
Fish/shellfish	Louisiana coastal	32 - 66
Waterfowl	Massachusetts coastal marsh	167
General	Michigan coastal marshes	843
Ecological services—		
Sediment accretion	Georgia river	3
Flood control	Massachusetts river	362
Water quality	Georgia river	1,108
Waste assimilation	Virginia tidal marsh	6,225
Life support	Georgia river	10,333
Other services—		
Education/research	Louisiana coastal	6
Recreation	Massachusetts river	38
Recreation	Louisiana coastal	45
Recreation	Florida estuary	76
Historic and archeological	Louisiana coastal	323
Market values:		
Market services—		
Waterfowl hunting	Mississippi bottomlands	12 - 17
Fish production	Virginia tidal marsh	269
Timber production	Georgia river	1,605
Aquaculture	Virginia tidal marsh	872 - 2,241

Sources: Bardecki (1984); Council on Environmental Quality (1978); Heimlich and Langner (1986); Heimlich (1994a).

Lessons for Resource Use and Conservation Policy

In this report we have examined how public agencies establish and participate in markets for partial interests in land as a means of balancing resource use and conservation. This review of partial interests provides several lessons for resource use and conservation policy.

First, property rights arise out of law, custom, and the operation of private markets. The Federal Government has long played a dual role in shaping property rights to influence land use in ways that accomplish public objectives. Public agencies help establish and define the distribution of property rights within which markets function, and they also participate in the resulting markets, for example, by buying and selling land and partial interests in land.

Second, partial interests can be acquired and conveyed in a variety of ways to accomplish a variety of resource use and conservation objectives on both public and private land. Programs differ in the ways in which they acquire easements, and also in the participants they attract. While public programs generally pay market value for easements, private programs generally seek donations or bargain sales. The former attract many offers but have relatively high acquisition costs and limited funds; the latter have lower acquisition costs but tend to appeal primarily to wealthier or more conservation-minded donors. Thus, the two types of programs are complementary.

Third, partial interests need to be tailored on a case-by-case basis to meet specific program and landowner goals on specific parcels of land, and can thus involve substantial costs in negotiation, acquisition, monitor-

ing, and enforcement. In some cases, these costs may even outweigh savings relative to regulation or outright land acquisition (table 7). In part because of the costs of negotiating, monitoring, and enforcement, markets for partial interests in land have thus far remained inactive, although mitigation banking offers an example of a promising market evolution in the case of wetlands. In general, however, it seems most likely that the importance of case-specific easement conditions will continue to make decentralized trading the most reasonable market structure in most situations. Furthermore, the cost comparisons summarized in table 7 suggest that no single policy strategy will be optimal in all situations.

Fourth, to reduce the costs of using partial interests as resource policy tools, Federal, State, and local government agencies may find it beneficial in some cases to work in partnership with nonprofit organizations that have similar objectives. With their ability to act quickly, take advantage of tax incentives, and mobilize local knowledge and support, such organizations can help public agencies acquire and convey partial interests more efficiently. It is critical that potential private partners are well aware of Federal standards with respect to appraisal and acquisition of interests in land, and that they work closely with Federal agencies from the beginning of any acquisition process.

Finally, given thin markets for partial interests themselves, the valuation of partial interests in land requires analysis of markets for underlying properties, recognizing the complications introduced by uncertainty, taxes, and social (nonmarket) values. The fair market value of the easement must then be estimated indirectly as the difference between the fair market value of the land unencumbered by the easement and

Table 7—Relative costs of alternative land-policy strategies

Item	Regulation	Partial interest acquisition	Land acquisition
Negotiation	low	high	medium
Acquisition	low	medium	high
Monitoring	medium - high	medium - high	low
Enforcement	medium - high	medium - high	low
Political	high	low	low

Note: relative magnitudes are intended to be comparable across columns, but not across rows.
Source: USDA/Economic Research Service.

the fair market value of the land encumbered by the easement, where the latter is based on the stream of market returns available to the landowner after the easement is granted. The amount of information available about future returns affects the estimated value of a conservation easement, and may also affect the optimal time of conversion between alternative land uses (depending on case-specific conditions).

In addition to considering fair market value, the role of income, estate, and property taxes must be considered in determining the after-tax value of alternative acquisition and conveyance strategies to particular landowners. In determining whether or not the easement should be acquired, public or private agencies must also compare an easement's market value with the nonmarket or social value of holding the easement, based on the stream of nonmarket or social benefits generated by the land in its easement-encumbered condition. Additional consideration must be given in order to rank multiple easement-acquisition opportunities, or to weigh easement

acquisition in particular or environmental protection in general against other public policy objectives. Questions of how much public money to spend on conservation easements, and how to distribute the determined amount according to geographic, environmental, and other criteria, will continue to be decided in the political arena.

Identification and valuation of partial interests shed light on the analytical approach necessary to evaluate recent legislative proposals regarding property rights. These proposals would require compensation not simply when a legal right is taken but whenever Federal agency actions diminish the value of a portion of a property more than a certain threshold percentage—regardless of other legal and economic criteria. Experience with partial interests suggests that determination of compensation levels under such proposals would require careful case-by-case analysis. Analysis of partial interests will likely also play a central role in the ongoing debate over reauthorization of the Clean Water Act and the Endangered Species Act.

References

- Agricultural Outlook*. 1994. "News Watch...Wetlands Signup for Flood-Stressed States." U.S. Dept. Agr., Econ. Res. Serv. May.
- Agricultural Resources: Cropland, Water, and Conservation Situation and Outlook*. 1992. AR-27. U.S. Dept. Agr., Econ. Res. Serv., September.
- Aiken, J. David. 1989. *State Farmland Preferential Assessment Statutes*. RB 310. Agricultural Research Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln. (Published in cooperation with the U.S. Dept. Agr., Econ. Res. Serv.) September.
- American Farmland*. 1994. Washington, DC: The American Farmland Trust. Fall.
- _____. 1991-92. Washington, DC: The American Farmland Trust. Winter.
- Anderson, William D., Gregory C. Gustafson, and Robert Boxley. 1975. "Perspectives on Agricultural Land Policy." Chapter 7 in *Resolved: That the Federal Government Should Adopt a Comprehensive Program to Control Land Use in the United States*. House of Representatives Document No. 94-253. Washington, DC: U.S. Government Printing Office.
- Arnold, Terri Finkbine. 1993. "Public Support for the Private Land Trust: A New Role in Federal Wetlands Protection?" *The Back Forty* 4(1). September/October.
- Arrow, Kenneth. 1978. "The Future and Present in Economic Life." *Economic Inquiry* 16:157-169.
- Bardecki, M.J. 1984. "What Value Wetlands?" *Journal of Soil and Water Conservation* 39(3). May-June.
- Berg, Norman A. 1994. "The Genesis of the CRP." In *When Conservation Reserve Program Contracts Expire: The Policy Options*. Ankeny, Iowa: Soil and Water Conservation Society.
- Black, Fischer, and Myron Scholes. 1973. "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy* 81.
- Brewer, Michael F. 1981. "Overview and Summary." In *Agricultural Land Availability: Papers on the Supply and Demand for Agricultural Lands in the United States*, edited by Michael F. Brewer. Prepared for the Committee on Agriculture, Nutrition, and Forestry, United States Senate. April.
- Buist, Henry, Carolyn Fischer, John Michos, and Abebayehu Tegene. 1995. *Purchase of Development Rights and the Economics of Easements*. AER-718. U.S. Dept. Agr., Econ. Res. Serv. June.
- Buland, David. 1995. Personal communication. U.S. Dept. Agr., Nat. Res. Cons. Serv., South Dakota. August 30.
- Butz, Don. 1994. Personal communication. U.S. Dept. Agr., Soil Cons. Serv. June 9.
- Canning, Patrick. 1994. "Conservation Compliance and Sodbuster." Section 6.3 in *Agricultural Resources and Environmental Indicators*, edited by Margot Anderson and Richard Magleby. AH-705. U.S. Dept. Agr., Econ. Res. Serv., December.
- Capozza, Denis R., and Yuming Li. 1994. "The Intensity and Timing of Investment: The Case of Land," *The American Economic Review* 84(4): 889-904.
- Capozza, Dennis R., and Gordon A. Sick. 1994. "The Risk Structure of Land Markets," *Journal of Urban Economics* 35: 297-319.
- Carey, Marc, Ralph Heimlich, and Richard Brazee. 1990. *A Permanent Wetland Reserve: Analysis of a New Approach to Wetland Protection*. AIB-610. U.S. Dept. Agr., Econ. Res. Serv., August.
- Closser, Jay E. 1993. "Assessing Land under Conservation Restrictions." In *Proceedings of the 59th Annual Conference of the International Association of Assessing Officers*. Washington, DC. September 19-22.

- Coase, Ronald. 1960. "The Problem of Social Cost," *Journal of Law and Economics*. October.
- Common Ground*. 1993. Newsletter of the Conservation Fund, Arlington, Virginia. Nov./Dec.
- Cook, Kenneth A. 1994. *So Long, CRP*. Washington, DC: The Environmental Working Group.
- Coughlin, Robert E., and John C. Keene (editors). 1981. *National Agricultural Lands Study — The Protection of Farmland: A Reference Guidebook for State and Local Governments*. A Report to the National Agricultural Lands Study from the Regional Science Research Institute, Amherst, Massachusetts.
- Council of Economic Advisers. 1996. *Economic Report of the President, together with the Annual Report of the Council of Economic Advisers*. Washington, DC: U.S. Government Printing Office. February.
- Council on Environmental Quality. 1978. *Our Nation's Wetlands—An Interagency Task Force Report*. U.S. Government Printing Office.
- Cowardin, Lewis M., Virginia Carter, Francis C. Golet, and Edward T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC.
- Dahl, T. E. 1990. *Wetlands Losses in the United States, 1780's to 1980's*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC.
- Daniels, Thomas L. 1994. Personal communication. Lancaster County Agricultural Preserve Board, Lancaster, Pennsylvania.
- _____. 1991. "The Purchase of Development Rights: Preserving Agricultural Land and Open Space." *Journal of the American Planning Association* 57(4). Autumn.
- _____. 1988. "America's Conservation Reserve Program: Rural Planning or Just Another Subsidy?" *Journal of Rural Studies* 4(4): 405-411.
- Daugherty, Arthur B. 1995. *Major Uses of Land in the United States, 1992*. AER-723. U.S. Dept. Agr., Econ. Res. Serv., September.
- Dettman, Shawn. 1994. "Alternatives to Rebuilding Levees." Presentation at the Annual Meeting of the Soil and Water Conservation Society, Norfolk, Virginia. August 7-10.
- Dideriksen, Raymond I., Allen R. Hidlebaugh, and Keith O. Schmude. 1977. *Potential Cropland Study*. SB-578. U.S. Dept. Agr., Soil Cons. Serv., October.
- Diehl, Janet, and Thomas S. Barrett. 1988. *The Conservation Easement Handbook*. San Francisco: The Trust for Public Land and the Land Trust Alliance.
- Dixit, Avinash K., and Robert S. Pindyck. 1994. *Investment Under Uncertainty*. Princeton: Princeton University Press.
- Environmental Law Institute. 1993. *Wetland Mitigation Banking*. Washington, DC: Environmental Law Institute.
- Farmland Preservation Report*. 1996. Street, Maryland: Bowers Publishing. April.
- _____. 1994. Street, Maryland: Bowers Publishing. April.
- Federal Register* 60(228). 1995a. "Federal Guidance for the Establishment, Use and Operation of Mitigation Banks." November 28.
- _____. 60(105). 1995b. "Natural Resources Conservation Service, 7 CFR Chapter VI and Part 620, Wetlands Reserve Program." June 1.
- _____. 58(227). 1993. "Soil Conservation Service, 7 CFR Part 623, Emergency Wetlands Reserve Program." November 29.
- Fischel, William A. 1982. "The Urbanization of Agricultural Land: A Review of the National Agricultural Lands Study," *Land Economics* 58(2).

- Frayer, W. E., T. J. Monahan, D. C. Bowden, and F. A. Graybill. 1983. *Status and Trends of Wetlands and Deepwater Habitats in the Conterminous United States, 1950's to 1970's*. Fort Collins: Colorado State University.
- Gardner, B. Delworth. 1977. "The Economics of Agricultural Land Preservation," *American Journal of Agricultural Economics* 59(5). December.
- Ginsberg, William R. 1988. "Term and Termination: When Easements Aren't Forever." In *The Conservation Easement Handbook*, edited by Janet Diehl and Thomas S. Barrett. San Francisco: The Trust for Public Land and the Land Trust Alliance.
- Hartmann, Paul. 1993. Personal communication. U.S. Fish and Wildlife Service, Denver. September 24.
- Heimlich, Ralph E. 1994a. "Wetlands and Riparian Areas: Economics and Policy." *Encyclopedia of Agricultural Science*. Academy Press.
- _____. 1994b. Personal communication. U.S. Dept. Agr., Econ. Res. Serv. November 7.
- _____. 1991. "Soil Erosion and Conservation Policies in the United States." Chapter 5 in *Farming and the Countryside: An Economic Analysis of External Costs and Benefits*, edited by Nick Hanley. London: CAB International.
- _____. 1986. "Agricultural Programs and Cropland Conversion, 1975-1981," *Land Economics* 62(2).
- Heimlich, Ralph E., and Linda L. Langner. 1986. *Swampbusting: Wetland Conversion and Farm Programs*. AER- 551. U.S. Dept. Agr., Econ. Res. Serv., August.
- Hexem, R. W., and W. D. Anderson. 1984. *Cropland Use and Supply: Outlook and Situation Report*. CUS-1. U.S. Dept. Agr., Econ. Res. Serv., September.
- Houthakker, Hendrik. 1969. "The Scope and Limits of Futures Trading." In *The Allocation of Economic Resources*, by Moses Abramowitz and others. Stanford, CA: Stanford University Press.
- Interagency Floodplain Management Review Committee (IFMRC). 1994. *Sharing the Challenge: Floodplain Management into the 21st Century*. Report to the Administration Floodplain Management Task Force, Washington, DC. June.
- Interagency Land Acquisition Conference. 1992. *Uniform Appraisal Standards for Federal Land Acquisition*. Washington, DC.
- Laitos, Jan G., and Richard A. Westfall. 1987. "Government Interference with Private Interests in Public Resources," *Harvard Environmental Law Review* 11(1).
- Lancaster County Agricultural Preserve Board (LCAPB). 1996. "1995 Farm Sales Report." Lancaster, PA.
- _____. 1995. *Annual Report, 1993*. March.
- _____. 1994. "200 Farms and Over 17,000 Acres Now Preserved," *Agricultural Preserve Board News*. Summer.
- Lancaster Farmland Trust News*. 1994. Lancaster, PA. December.
- Land Exchange* 13(2), 1994. "Land Trust Help Sought in Easement-Debt Cancellation." Washington, DC: Land Trust Alliance. Spring.
- Land Letter*. 1994. Arlington, VA: The Conservation Fund. May 1.
- Land Trust Alliance (LTA). 1991. *1991-92 National Directory of Conservation Land Trusts*. Washington, DC.
- Land Trust Alliance & National Trust for Historic Preservation (LTA & NTHP). 1990. *Appraising Easements: Guidelines for Valuation of Historic Preservation and Land Conservation Easements*. Washington, DC (2nd edition).
- Lant, Christopher L., Steven E. Kraft, and Keith R. Gillman. 1995. "Enrollment of filter strips and recharge areas in the CRP and USDA easement programs." *Journal of Soil and Water Conservation* 50(1). March-April.

- Laycock, William A. 1991. "The Conservation Reserve Program — How Did We Get Where We Are and Where Do We Go From Here?" In *The Conservation Reserve — Yesterday, Today and Tomorrow*. General Technical Report RM-203. Symposium Proceedings, U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Lee, Linda K. 1984. "Urban and Built-up SCS Data—An Historical Perspective." Paper presented at the workshop on Land Retention in the Southeast, Knoxville, Tennessee, March 22.
- LTA Landscape*. 1993. Washington, DC: Land Trust Alliance. December.
- Magleby, Richard, Carmen Sandretto, William Crosswhite, and C. Tim Osborn. 1995. *Soil Erosion and Conservation in the United States: An Overview*. AIB-718. U.S. Dept. Agr., Econ. Res. Serv. October.
- Malme, Jane. 1993. "Preferential Property Tax Treatment of Land." Cambridge, MA: Lincoln Institute of Land Policy.
- Margheim, Gary A. 1994. "Soil erosion and sediment control." In *When Conservation Reserve Program Contracts Expire: The Policy Options*. Ankeny, Iowa: Soil and Water Conservation Society.
- McNulty, Maureen. 1994. Personal communication. American Farmland Trust. June 7.
- Miszczynski, Dean J. 1978. "Land-Use Controls and Property Values." Chapter 5 in *Windfalls for Wipeouts: Land Value Capture and Compensation*, edited by Donald Hagman and Dean Miszczynski. Chicago: American Society of Planning Officials.
- Misso, Bob. 1995. Personal communication. U.S. Dept. Agr., Nat. Res. Cons. Serv. March 28 and September 19.
- Mitchell, Robert Cameron, and Richard T. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, DC: Resources for the Future.
- Musselman, Alan R. 1994. Personal communication. Lancaster Farmland Trust. June 21.
- Myers, Peter C. 1991. "Future Costs and Benefits of Conservation Reserve Lands." In *The Conservation Reserve — Yesterday, Today and Tomorrow*. General Technical Report RM-203. Symposium Proceedings, U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Osborn, Tim. 1996. Personal communication. U.S. Dept. Agr., Econ. Res. Serv. June 27.
- _____. 1994a. "Conservation Reserve Program." Section 6.2 in *Agricultural Resources and Environmental Indicators*, edited by Margot Anderson and Richard Magleby. AH-705. U.S. Dept. Agr., Econ. Res. Serv. December.
- _____. 1994b. *RTD Updates: Conservation Reserve Program*. U.S. Dept. Agr., Econ. Res. Serv. January; No. 2.
- Osborn, Tim, and Ralph Heimlich. 1994. "Changes Ahead for Conservation Reserve Program," *Agricultural Outlook*. July.
- Osborn, C. Tim, Felix Llacuna, and Michael Linsenbigler. 1995. *The Conservation Reserve Program: Enrollment Statistics for Signup Periods 1-12 and Fiscal Years 1986-93*. SB-925. U.S. Dept. Agr., Econ. Res. Serv. November.
- _____. 1992. *The Conservation Reserve Program: Enrollment Statistics for Signup Periods 1-11 and Fiscal Years 1990-92*. SB-843. U.S. Dept. Agr., Econ. Res. Serv. November.
- Osborn, C. Tim, Max Schnepf, and Russ Keim. 1994. *The Future Use of Conservation Reserve Program Acres: A national survey of farm owners and operators*. Ankeny, IA: Soil and Water Conservation Society.
- Pindyck, Robert S. 1991. "Irreversibility, Uncertainty, and Investment," *Journal of Economic Literature* 29(3).
- Pins, Kenneth. 1993. "Some flooded farmland will convert to wetlands," *Des Moines Register*. October 8.

- Powell, Richard R. 1989 (originally published in 1949). *The Law of Real Property*, Volume 3. New York: Matthew Bender.
- Renne, J. Scott. 1993. "Highest and Best Use: What Happens When Things Are Broken?" *Proceedings of the 59th Annual Conference of the International Association of Assessing Officers*, Washington, DC. September 19-22.
- Ribaudo, Marc O., and others. 1990. *Natural Resources and Users Benefit from the Conservation Reserve Program*. AER-627. U.S. Dept. Agr., Econ. Res. Serv. January.
- Schnidman, Frank. 1986. "The Evolving Federal Role in Agricultural Land Preservation," *The Urban Lawyer* 18(2). Spring.
- Sherman, David. 1995. Personal communication. U.S. Dept. Agr., Forest Service. October 6.
- Sick, Gordon. 1989. *Capital Budgeting with Real Options*. Monograph 89-3, Solomon Brothers Center, Leonard N. Stern School of Business, New York University.
- Small, Stephen J. 1992. *Preserving Family Lands: Essential Tax Strategies for the Landowner*. Boston: Landowner Planning Center.
- _____. 1990. *The Federal Tax Law of Conservation Easements*. Alexandria, VA: The Land Trust Alliance.
- Snow, James B. 1992. "Reserved Interest Deeds: An Alternate Approach to Drafting Conservation Easements." *The Back Forty* 2(7). January/February.
- Soil and Water Conservation Society. 1994. *Farmer Perspectives on the Wetlands Reserve Program*. Ankeny, Iowa.
- Stockford, Daniel C. 1990. "Property Tax Assessment of Conservation Easements." *Boston College Environmental Law Affairs Review* 17.
- Tenenbaum, David. 1994. "Rethinking the River," *Nature Conservancy* 44(4). July/August.
- The Nature Conservancy. 1994. "TNC Land Protection Statistics, 31 December 1994." Arlington, VA.
- Thompson, Edward, Jr. 1995. "Winning Friends, Losing Ground: States and Local Communities Need a Federal Partner to Protect the Nation's Farmland." Washington, DC: American Farmland Trust. July.
- U.S. Department of Agriculture. 1975. *Recommendations on Prime Lands*. Prepared at the Seminar on the Retention of Prime Lands July 16-17, 1975, sponsored by the USDA Committee on Land Use.
- U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service (ASCS). 1994. "FY 1995 Appropriations Action." June 24.
- _____. 1993. *1992 Wetlands Reserve Program: Report to Congress*. February.
- _____. 1992. *Farm Program Fact Sheet: Pilot Wetlands Reserve Program*. June.
- U.S. Department of Agriculture, Forest Service, 1994. *Summary of Forest Legacy Listening Sessions*. February 2.
- _____. 1992. *Forest Legacy Program Implementation Guidelines (Final)*.
- _____. 1991. *Grazing Statistical Summary, FY1991*.
- _____, and U.S. Department of the Interior, Bureau of Land Management. 1992. *Grazing Fee Review and Evaluation Update of the 1986 Final Report*. April 30.
- U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 1996. *Summary of the Wetlands Reserve Program and Emergency Wetlands Reserve Program*. August 22.
- U.S. Department of Agriculture, Office of Public Affairs (OPA). News releases, January 5, 1994; February 7, 1994; April 7, 1994; April 12, 1994; July 13, 1994; December 14, 1994, May 9, 1995.

- U.S. Department of Agriculture, Soil Conservation Service (SCS). (various years.) *National Resources Inventory 1982, 1987, and 1992*; also the 1991 NRI *Wetlands Update*.
- U.S. Department of the Interior, Bureau of Land Management (BLM). 1995. *Public Rewards from Public Lands*. August.
- _____. 1994. *Public Land Statistics, 1993*. September.
- U.S. Department of the Interior, Office of Inspector General (OIG). 1992. *Department of the Interior Land Acquisitions Conducted with the Assistance of Nonprofit Organizations*. Audit Report No. 92-I-833. May.
- U.S. Environmental Protection Agency (EPA), Office of Water, Office of Wetlands, Oceans, and Watersheds. 1993. *Wetlands Fact Sheet #30: Partnerships with Landowners*. EPA843-F-93-001dd.
- U.S. General Accounting Office (GAO). 1995. *Conservation Reserve Program: Alternatives Are Available for Managing Environmentally Sensitive Cropland*. GAO/RCED-95-42. February.
- _____. 1994. *Federal Lands: Land Acquisitions Involving Nonprofit Conservation Organizations*. GAO/RCED-94-149. June.
- U.S. General Services Administration. 1995. *Summary Report of Real Property Owned by the United States Throughout the World as of September 30, 1993*. July.
- Vesterby, Marlow, Ralph E. Heimlich, and Kenneth S. Krupa. 1994. *Urbanization of Rural Land in the United States*. AER-673. U.S. Dept. Agr., Econ. Res. Serv. March.
- Vosick, Diane. 1993. Personal communication. The Nature Conservancy. December 14.
- Ward, Justin R., F. Kaid Benfield, and Anne E. Kinsinger. 1989. *Reaping the Revenue Code: Why We Need Sensible Tax Reform for Sustainable Agriculture*. New York: Natural Resources Defense Council.
- Wiebe, Keith. 1995. *AREI Updates: Land Trusts*. No. 13. U.S. Dept. Agr., Econ. Res. Serv.
- _____. 1994. *RTD Updates: Land Trusts*. No. 2. U.S. Dept. Agr., Econ. Res. Serv. July.
- Wiebe, Keith D., and Ralph E. Heimlich. 1995. "The Evolution of Federal Wetlands Policy," *Choices*.
- Williams, Curtis F. 1991. *Alternative Income Sources Affecting CRP Enrollment Decisions*. M.S. Thesis (Agricultural Economics), Texas A&M University. August.
- Wooten, H. H. 1965. *The Land Utilization Program 1934 to 1964*. AER-85. U.S. Dept. Agr., Econ. Res. Serv.
- Wunderlich, Gene. 1991. *Owning Farmland in the United States*. AIB-637. U.S. Dept. Agr., Econ. Res. Serv. December.
- Young, C. Edwin, and C. Tim Osborn. 1990. *The Conservation Reserve Program: An Economic Assessment*. AER-626. U.S. Dept. Agr., Econ. Res. Serv. February.
- Young, Edwin, and Dennis A. Shields. 1996. "Provisions of the 1996 Farm Bill—the Federal Agricultural Improvement and Reform (FAIR) Act," *Agricultural Outlook*. April.
- Youngman, Joan M. 1993. "Concepts of Property and Taxation." Chapter 5 in *Land Ownership and Taxation*, edited by Gene Wunderlich. Boulder, CO: Westview Press.

Appendix--Alternative Ways to Estimate the Value of a Conservation Easement

The table below summarizes alternative ways to estimate the per-acre value of a conservation easement, as discussed in the text, based on the expected net returns illustrated in figure 4.

- R_{at} expected annual net returns to agricultural use (\$100 per acre every year)
- R_{ut} expected annual net returns to urban use (\$50 per acre in the first year, then \$150 per acre every year thereafter)
- i discount rate (5 percent per year, every year)
- T duration of the easement (infinite)
- V_{B0} today's per-acre value of the land before restrictions are imposed (determined below)
- V_{A0} today's per-acre value of the land after restrictions are imposed (\$2,000 per acre)
- V_{e0} today's per-acre easement value; = $V_{B0} - V_{A0}$ (determined below)
- t^* optimal time to convert from agricultural to developed use (determined below)

Method 1 compares the two uses assuming that expected returns remain constant at current levels.
 Method 2 compares the two uses recognizing that expected urban returns change after the first year.
 Method 3 considers the best sequence of uses, if conversion were to take place at the optimal time.
 Method 4 considers the option of waiting for more information on adjacent development plans.

	V_{B0}	V_{A0}	V_{e0}	t^*
1	$\max\{R_{a0}, R_{u0}\}/i$ $= \max\{100, 50\}/0.05$ $= \$2,000$	R_{a0}/i $= 100/0.05$ $= \$2,000$	$\$2,000$ $- \underline{\$2,000}$ $= \$0$	never
2	$\max\{\sum_{t=1}^{\infty} R_{at}/(1+i)^t, \sum_{t=1}^{\infty} R_{ut}/(1+i)^t\}$ $= \max\{\sum_{t=1}^{\infty} 100/1.05^t, 50/1.05 + \sum_{t=2}^{\infty} 150/1.05^t\}$ $= \max\{2000, 48 + 2857\}$ $= \$2,905$	$\sum_{t=1}^{\infty} R_{at}/(1+i)^t$ $= \sum_{t=1}^{\infty} 100/1.05^t$ $= 100/0.05$ $= \$2,000$	$\$2,905$ $- \underline{\$2,000}$ $= \$905$	1st year
3	$\sum_{t=1}^{\infty} \max\{R_{at}, R_{ut}\}/(1+i)^t$ $= \max\{R_{a1}, R_{u1}\}/1.05 + \sum_{t=2}^{\infty} \max\{R_{at}, R_{ut}\}/1.05^t$ $= \max\{100, 50\}/1.05 + \sum_{t=2}^{\infty} \max\{100, 150\}/1.05^t$ $= \$95 + \$2,857$ $= \$2,952$	$\sum_{t=1}^{\infty} R_{at}/(1+i)^t$ $= \sum_{t=1}^{\infty} 100/1.05^t$ $= 100/0.05$ $= \$2,000$	$\$2,952$ $- \underline{\$2,000}$ $= \$952$	2nd year
4	$R_{a1}/(1+i) + 0.5(\sum_{t=2}^{\infty} \max\{R_{at}, R_{ut}^H\}/(1+i)^t)$ $\quad + 0.5(\sum_{t=2}^{\infty} \max\{R_{at}, R_{ut}^L\}/(1+i)^t)$ $= 100/1.05 + 0.5(\sum_{t=2}^{\infty} \max\{100, 250\}/1.05^t)$ $\quad + 0.5(\sum_{t=2}^{\infty} \max\{100, 50\}/1.05^t)$ $= \$95 + \$2,381 + \$952$ $= \$3,429$	$\sum_{t=1}^{\infty} R_{at}/(1+i)^t$ $= \sum_{t=1}^{\infty} 100/1.05^t$ $= 100/0.05$ $= \$2,000$	$\$3,429$ $- \underline{\$2,000}$ $= \$1,429$	2nd year or never

Index

Page references in *italic* type refer to figures; page references in **bold** type refer to tables

- A**
- After-tax value
 - estate taxes, 40-41, 45
 - implications for landowner decisionmaking, 41
 - income taxes, 40, 45
 - property taxes, 41, 45
 - Agricultural zoning ordinances, 11
 - American Farmland Trust, **6**
 - acquisition of agricultural conservation easements, 11
 - land trusts, 27
 - Appraisal methods, 34
 - Appraising Easements*, 34
- B**
- Before-and-after comparisons for fair market valuation, 33
 - Bidding. *See* Valuation
 - BLM. *See* Bureau of Land Management
 - Brokerage of conservation easements, 27
 - Bundle of rights, 2
 - Bureau of Land Management
 - partnerships with nonprofit organizations, 30
- C**
- Call options, 6
 - Capital gains taxes, 24
 - Clean Water Act
 - mitigation requirements, 31
 - reauthorization of, iv, 1, 45
 - wetlands regulation, 20
 - Clinton administration
 - "no net loss" goal for wetlands, 20
 - Commodity Credit Corporation
 - Farmland Protection Program funding, 13-14
 - Comparable sales approach for appraisal, 34
 - Compensation for diminished property values, iv, 2, 45
 - Conservation easements, 4-6
 - agencies involved in easement acquisition, **6**
 - agricultural conservation easement programs, **12**
 - case-by-case negotiation, iii, iv, 27, 29, 44
 - conventional easements, 5
 - development rights, 5
 - donations of, 12, 24, 40-41
 - draft easement contracts, 28
 - markets for, 24-32
 - perpetuity, 12, 29
 - purchase-of-development-rights programs, 12
 - reserved-interest easements, 27
 - summary table, **iv**
 - term length, 12
 - valuation of, iii, 33-43, 52
 - The Conservation Fund, **6**, 23
 - Conservation Reserve Program, 7, 14-19
 - benefits, 15
 - bidding and valuation procedures, 16, 18, 42
 - buffer strips, 18
 - contract extensions, 18
 - enrollment, 8, 8, 9, 16, **17**
 - fair market value, 29, 42
 - modification and renewal prospects, 18-19
 - reauthorization of, 1
 - rental value of enrolled cropland in
 - compatible uses, 42
 - secondary trading, 28
 - soil erosion, 14
 - term length, 14, 18
 - Corn Belt
 - Conservation Reserve Program, 19
 - Wetlands Reserve Program, 8
 - CRP. *See* Conservation Reserve Program
- D**
- Developers
 - acquisition of the right to develop a property, 25
 - Development rights, 4, 5
 - See also* Purchase-of-development-rights programs
 - Ducks Unlimited, 23
 - Dust Bowl, 14

E

Easements. *See* Conservation easements.

Economic Report of the President
achievements of land trusts, 30

ELI. *See* Environmental Law Institute

Emergency Wetlands Reserve Program, 21-23
areas affected, 21, 22
authorization for, 21
bidding and valuation, 23
enrollment numbers, 21, 23

Eminent domain, 4, 29

Endangered Species Act
reauthorization of, iv, 1, 45

Environmental Law Institute
wetlands mitigation banks, 32

Environmental Protection Agency
wetlands restoration program contributions, 23
wetlands ownership estimates, 19

Escheat, 4

Estate taxes, 24, 40-41, 45

F

Fair market value, 33-40
alternative ways to estimate the value of a conservation easement, 38, 52
appraisal methods, 34
before-and-after comparisons, 33
farmland example, 36-39
highest and best use, 33-35
irreversible investment under uncertainty, 39-40
sequence of highest and best uses over time, 34-35
uncertainty, 35-36

Farm Bill of 1985, 15

Farm Bill of 1990
CRP bids, 16, 18
Forest Legacy Program, 31

Farm Bill of 1996. *See* Federal Agriculture Improvement and Reform Act

Farm real estate values between 1910 and 1995, 2, 3

Farm Service Agency
CRP administration, 15
CRP bids, 16, 18
land trust help with farmer education, 30

Farmed wetlands, 16

Farmland Protection Policy Act, 13

Farmland Protection Program, 1, 13-14

Farmland protection programs
areas, 8, 8, 12
costs, 13
development rights and easements, 11-13
evolution of strategies, iii, 11
Federal role, 13-14
land use classifications, 10
property taxes, 41
public and private goals, 13
urbanization, 10
valuation, iv, 14, 35-42

Farms for the Future Act, 13

Federal Agriculture Improvement and Reform Act, iii, 1
CRP enrollment caps, 18
Farmland Protection Program, 13
WRP changes, 21

Federal Emergency Management Agency, 23

Federal Government. *See* U.S. Government; *specific agencies by name*

Federal Swampland Acts, 19

Federal Water Pollution Control Amendments of 1972.
See Clean Water Act

Fish and Wildlife Foundation, 23

Fish and Wildlife Service, 6
Louisa County, Iowa, wetlands restoration program contributions, 23
Mark Twain Wildlife Refuge, 23
Partners for Wildlife Program, 32
partnerships with nonprofit organizations, 30
refuge and flowage easements, 6
restoration plan for wetlands, 21
Small Wetlands Acquisition Program, 20
Water Bank Program, 20
wetlands estimates, 19, 20

Florida
wetlands mitigation banks, 32

Food, Agriculture, Conservation, and Trade Act of 1990
Wetlands Reserve Program authorization, 20
See also Farm Bill of 1990

Food Security Act
sodbuster and swampbuster provisions, 8, 15, 20, 32
See also Farm Bill of 1985

Forest Legacy Program, 31
Forest Service, 6
 partnerships with nonprofit organizations, 30-31
 satellite dish installations, 27

FSA. *See* Farm Service Agency

G

GAO. *See* General Accounting Office

General Accounting Office
 CRP report, 18
 nonprofit organizations' role in land
 acquisition, 30-31

Grazing permits, 4

H

Highest and best use
 appraisal methods, 34
 criteria, 33-34
 definition, 34
 sequence over time, 34-35

Homestead Acts, 14

I

Income approach for appraisal, 34

Income taxes
 fair market value of land, 40, 45

Interagency Floodplain Management Review
 Committee, 30

Interagency Land Acquisition Conference
 *Uniform Appraisal Standards for Federal Land
 Acquisitions revisions*, 28

Internal Revenue Code
 conservation easement donations, 12
 See also Tax issues

Iowa Natural Heritage Foundation, 6, 23

Iowa River Corridor Project, 30

Irreversible investment under uncertainty, 39-40

L

Lancaster County (PA) Agricultural Preserve Board, 6
 farmland preservation program, 13
 waiting list, 25, 39

Lancaster Farmland Trust, 13

Land and Water Conservation Fund, 30

Land ownership, 2

Land Trust Alliance
 farmland protection survey, 12-13
 National Rally, 28
 number of land trusts, 25

Land trusts, 25-27, **26**
 partnerships with Federal agencies, 29-31
 secondary trading, 28

Land Utilization Program, 14

Landowners, 24-25
 decisionmaking, 41

LCAPB. *See* Lancaster County (PA) Agricultural
 Preserve Board

Lessons for resource use and conservation
 policy, 44-45

Livestock-use permits, 4

Louisa County (IA) Soil and Water Conservation
 District, 23

M

Maine Coast Heritage Trust, 6

Mark Twain Wildlife Refuge, 23

Markets for partial interests
 lessons for resource use and conservation policy, 44
 participants
 developers, 25
 land trusts, 25-27, **26**
 landowners, 24-25
 nonprofit organizations, 25, 27
 public agencies, 25
 partnerships, iii, 29-31, 44
 mitigation banking, 31-32
 transactions
 brokerage, 27
 monitoring and enforcement, iii, 28, 44, **44**
 negotiation, appraisal, settlement, and recording,
 iii, 27-28, 44, **44**
 perpetuity, 29
 secondary trading, 28

MARRs. *See* Maximum acceptable rental rates

Maryland
 buying back of easements, 29

conservation easement program, 12
farmland assessment for property tax purposes, 11
first statewide PDR program, 11
Maryland Agricultural Land Preservation
Foundation, 6, 12
Maximum acceptable rental rates
Conservation Reserve Program, 18
Mineral leases, 4
Mitigation banking, 31-32
Montana Land Reliance, 6

N

NALS. *See* National Agricultural Lands Study
Natchez Trace Parkway
scenic view preservation, 5-6
National Agricultural Lands Study, 10
National Audobon Society, 27
National Park Service, 6
partnerships with nonprofit organizations, 30
use of easements to preserve scenic views, 5-6
National Resources Inventory
rural land loss, 10
wetlands loss, 20
Natural Resources Conservation Service, 6
Louisa County, Iowa, wetlands restoration program
contributions, 23
mitigation banks, 32
restoration plan for wetlands, 21
wetlands estimate, 20
The Nature Conservancy, 6, 27
floodplain easement acquisition, 30
Louisa County, Iowa, wetlands restoration program
contributions, 23
Nonprofit organizations, 6
description, 25
land trusts, 25-27, 29-31
partnerships with, iii, 29-31, 44
See also specific organizations by name
NPS. *See* National Park Service
NRCS. *See* Natural Resources Conservation Service
NRI. *See* National Resources Inventory

O

Options, 6-7
easement valuation, 37-39
irreversible investment under uncertainty, 39-40

P

Partial interests, iii, 1, 2
development rights, 4
multiple parties, 2, 4
policy settings
Conservation Reserve Program, iii, 14-19
farmland protection, iii, 10-14
Wetlands Reserve Program, iii, 19-23
policy tools for resource use and conservation
conservation easements, iii, 4-6
Federal role, iii, 7-8
options, 6-7
private interests in public land, iii, 4
property and ownership, iii, 2, 44
Partners for Wildlife Program, 32
PDR programs. *See* Purchase-of-development-rights
programs
Peninsula Township (MI) PACE program, 12
Pennsylvania
buying back of easements, 29
sale of easement-encumbered farms, 28
See also Lancaster County Agricultural Preserve
Board
See also Lancaster Farmland Trust
Pheasants Forever, 23
Police power
as government right to private property, 4
Policy tools for resource use and conservation
conservation easements, 4-6
Federal role in partial interests as policy tools, 7-8
options, 6-7
private interests in public land, 4
Potential Cropland Study, 10
Preferential assessment, 11
Private interests in public land, 4
Private property owners
compensation for diminished property
values, iv, 2, 45
government interests, 4

Property rights, iii, 1, 44-45

Property taxes, 41, 45

Public agencies

conservation easement purchases, 6, 25

partnerships, 29-31

See also specific agencies by name

Purchase-of-development-rights programs

conservation easement acquisition programs, 12

history of, 11-12

R

Real estate options, 6-7

Real property

description, 2

farm real estate values between 1910 and 1995, 2, 3

Relative costs of alternative land-policy strategies, 44

Reserved-interest easements, 27

S

Satellite dish installations, 27

SCS. *See* Soil Conservation Service

Secondary trading of conservation easements, 28

Small Wetlands Acquisition Program, 20

Social value, 33, 41-42, 45

Sodbuster program, 8, 15

Soil and Water Conservation Society

survey of CRP contract holders, 19

Soil Bank program, 14-15

Soil Conservation Service

creation of, 14

Potential Cropland Study, 10

See also Natural Resources Conservation Service

Soil erosion

Conservation Reserve Program, 14

Swampbuster program, 8, 20, 32

SWCS. *See* Soil and Water Conservation Society

T

Tax issues

capital gains, 24

conservation easement donations, 12, 24

estate taxes, 24, 40-41, 45

as government interest in private property, 4

implications for landowner decisionmaking, 41

income taxes, 40, 45

as indirect Federal role in partial interests, 7

preferential assessments, 11

property taxes, 41, 45

Tax Reform Act and farmland protection, 14

See also After-tax value; Internal Revenue Code; *specific types of taxes by name*

Tax Reform Acts

capital gains from land conversion, 20

conservation easement donations, 40

farmland protection, 14

Transactions

brokerage, 17

monitoring and enforcement, iii, 28, 44, 44

negotiation, appraisal, settlement, and

recording, iii, 27-28, 44, 44

perpetuity, 29

secondary trading, 28

Trust for New Hampshire Lands, 6

Trust for Public Land, 6

U

Uncertainty

farmland example, 36-39

irreversible investment under, 39-40

optimal time of conversion, 39

ways to deal with, 35-36

Uniform Appraisal Standards for Federal Land Acquisitions, 28, 30

Uniform Relocation Assistance and Real Property

Acquisition Policy Act

fair market value for land acquisition, 29

Urbanization

farmland protection, 10

wetlands, 20

U.S. Army Corps of Engineers, 20

U.S. Department of Agriculture

Committee on Land Use

recommendations for farmland use, 10

cropland eligibility criteria for CRP, 16

Forest Legacy Program, 31

See also Soil Conservation Service, Natural

Resources Conservation Service, Forest Service,

Farm Service Agency

U.S. Department of Energy
land acquisitions, 31

U.S. Department of the Interior
nonprofit organizations' role in land acquisition, 30
See also Bureau of Land Management, Fish and
Wildlife Service, National Park Service

U.S. Government
role in land ownership rights distribution, 1
role in partial interests as policy tools, 7

USDA. *See* U.S. Department of Agriculture

Use-value assessment, 11

V

Valuation
after-tax value, 40-41
basis for, 33
Conservation Reserve Program, 16, 18
Emergency Wetlands Reserve Program, 23
fair market value, 33-40
farmland example, 36-39
farmland protection programs, 14
land as an asset, 33
lessons for resource use and conservation
policy, 44-45
social value, 41-42, 45
Wetlands Reserve Program, 23

W

Water Bank Program, 20

Wetlands
benefits of, 5
description, 19
farmed wetlands, 16
functions and estimated values, 43
mitigation banking, 32
mitigation requirements, 31-32
"no net loss" goal, 20

Wetlands Reserve Program, 7, 20-21
areas, 8, 9, 21
bidding and valuation, 23, 42
Emergency Wetlands Reserve Program, 21-23
fair market value for land acquisition, 29
farmed wetlands, 16
land trust participation in easement monitoring, 30
policy evolution, iii, 19-20
property taxes, 41
reauthorization of, 1
reserved-interest easements, 27
secondary trading, 28
State participation, 22
term length, 20-21, 42
wetlands description, 19

Wild and Scenic Rivers, 27

WRP. *See* Wetlands Reserve Program

Z

Zoning ordinances, 11

