

Multifunctional Agriculture – A View from the United States

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1. Background

Although agriculture's primary function is the production of food and other commodities, we recognize that it is also the source of many non-commodity outputs. Most agricultural commodities are traded on well-organized markets. In contrast, most non-commodity outputs, such as food safety, contributions to the environment, landscape amenities and cultural heritage are not traded on such markets.² Despite this, non-commodity outputs are clearly valued by the inhabitants of rich countries, and that valuation appears to increase as their incomes and wealth rise.

It is through the term “multifunctionality” that concerns about the provision of non-commodity outputs were added to the debate on agricultural policy and to international negotiations on reducing trade barriers. Views on how to reconcile multifunctionality with freer trade appear to divide along two relatively distinct lines. Some argue that without the continuation of current agricultural policies, freer trade will jeopardize the provision of public goods and positive externalities provided by agriculture. The opposing view is that such policies are primarily designed to protect agriculture from international competition and to perpetuate existing trade distortions.³

Economists have increasingly weighed in on the debate about multifunctionality. Although approaches vary and conclusions differ in degree, most analytical frameworks for addressing the issues build on a set of common results from the production economics, trade, and environmental economics literature. Blandford and Boisvert (2002), for example, argue that the issues surrounding multifunctionality are too complex in their global, country-specific, and local dimensions to be resolved within the traditional domestic/international trade policy paradigm. Focusing on environmental outputs, they argue for a policy approach that directly addresses the role of agriculture as a major user of land in the provision of such outputs.

In theory, welfare maximizing Pigouvian taxes and subsidies applied to the non-commodity outputs of agriculture would internalize their external benefits and costs (e.g. Baumol and Oates, 1988; and Boisvert, 2001a, b), but the implementation of such an approach poses significant challenges.⁴ In particular, it would require measures of the marginal benefits and costs associated with each non-commodity output, as well as knowledge of the relationship between non-commodity and

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² Some would include in the list of non-commodity outputs the contributions of agriculture to rural viability and food security (OECD, 2001).

³ It is easy to predict where the battle lines have been drawn. High cost producers with high levels of domestic support see the continued provision of subsidies to agriculture as the way to secure multifunctional public benefits. Low cost producers argue that such subsidies, particularly when provided through commodity programs, are neither optimal nor desirable for ensuring desired levels of such benefits.

⁴ Although they differ in approach, the policy prescriptions by Romstad *et al.* (2000), Paarlberg *et al.* (2002), Peterson *et al.* (2002), Chang *et al.* (2004) recognize the same issues.

commodity outputs. In addition to the difficulties inherent in identifying and measuring what should be valued, Hoehn and Randall (1989) and Carson *et al.* (1998) highlight the problems that can arise if net social benefits for jointly produced non-market goods are estimated by summing values derived independently through conventional valuation procedures. By ignoring joint production and policy interactions, such procedures will systematically overstate benefits or understate costs.⁵ Randall (2002) has recently proposed a strategy for addressing these issues, but no empirical work using his proposed method has been attempted to date.

Faced with these substantial obstacles, most would agree that there is little hope of formulating policies to achieve a socially optimal supply of the non-commodity outputs of agriculture. A workable solution might be to specify conditions and actions that are likely to lead to an increase in the supply of desired non-commodity outputs or attributes, e.g., a set of production standards that will result in improved animal welfare or standards for the maintenance of areas of wildlife habitat. The cost-effectiveness of alternative combinations of regulation and monetary incentives to achieve an increase in the supply of such desired outputs could then be evaluated.⁶

The extent to which the concept of “multifunctionality” is relevant for public perceptions and policies differs by country. The contrast between Europe and the United States may well represent two extremes. European views on the multifunctional attributes of agriculture appear to encompass a wide range of potential attributes. These seem to include those relating primarily to land use, such as protection of wildlife habitat, biodiversity, and the provision of landscape amenities, through to various social attributes such as agriculture’s contribution to cultural heritage, the viability of rural communities, and food security.

In the United States, to the extent that the concept of multifunctionality is recognized at all, the primary focus is on environmental attributes associated with agricultural production. One might speculate on the reasons for this emphasis, but a history of the relatively recent development of a seemingly limitless natural resource base by a largely immigrant population has clearly played a major role in shaping attitudes towards agriculture in the United States. Despite this rather limited focus, there has been a long history of environmental provisions in U.S. agricultural policy, dating back to soil conservation programs in the 1930s. As with much U.S. legislation, a crisis provided the impetus for action. The crisis was partly environmental in nature (soil erosion in the mid-part of the nation created by drought and poor farming practices), and partly political (a loss of the government’s legal authority to regulate production and to support farm product prices).

The marriage of price and income support objectives with environmental aims has been an enduring feature of U.S. policies, although the range of policy aims has gradually expanded to include such issues as the preservation of wetlands and wildlife habitat. Measures implemented by federal agencies other than the U.S. Department of

⁵ Carson *et al.* (1998) note one particular disturbing aspect of valuation efforts: “...the observation that if one summed the public’s estimated values for individual environmental amenities, the sum may exceed disposable income.” (p. 314).

⁶ Baumol and Oates (1988) emphasize the fact that regulatory agencies such as the U.S. Environmental Protection Agency often adopt standards as an effective way to ensure appropriate levels of environmental quality.

Agriculture (USDA) also address pollution and water quality issues associated with agricultural production. As a result of the growth of population and a rapid increase in the demand for land for non-agricultural purposes at the rural-urban fringe, there has been a marked expansion in state and local policies designed to protect farmers' property rights (right-to-farm legislation) and to promote the retention of land in farming (treatment of property taxes and purchase of development rights). A broad range of policy goals, not simply environmental considerations, is reflected in such state and local initiatives.

2. Aims of the Paper

In this paper we review the evolution of U.S. agri-environmental policies at the federal, state and local levels, and their relationship to other policy aims, such as price and income support for farmers. We then evaluate the extent to which current policies can be expected to lead to an optimal supply of environmental goods, and to minimize negative environmental externalities. In terms of agricultural legislation, the U.S. approach to these issues has a number of important features, whose implications we shall evaluate. These features include: 1. a traditionally close relationship between conservation policies, particularly their land retirement aspects, and price and income support policies; 2. a reliance on incentive-based approaches for achieving environmental aims, rather than compulsion or penalty approaches (regulation and taxation); and 3. the increasing devolution of policy formulation and implementation from the federal level to the state and local levels. In the final part of the paper, we offer some observations on the relationship between U.S. agri-environmental policies and the current WTO negotiations on trade liberalization.

3. The Development of Environmental Policies Affecting Agriculture

In the United States, agriculture is affected by environmental legislation, broadly defined, at the federal, state and local levels. We first review the evolution of environmental provisions that have been part of U.S. agricultural legislation since the 1930s. Next, we review the policies of other federal agencies, particularly those of the U. S. Environmental Protection Agency, that also address environmental issues and have direct implications for agriculture, particularly measures relating to water quality and worker health and safety. Finally, we review state and local initiatives that began in the early 1970s to promote the retention of farmland and to protect farmers' rights to farm in the face of encroaching urban development.

Agricultural Policies and the Environment

The environmental provisions of U.S. agricultural policies have their origin in the political pressures created by agriculture's deteriorating economic position. Problems in rural areas caused by persistent low commodity prices and their impact on farmers' incomes in the years following the First World War were exacerbated by the severe economic depression of the early 1930s. The Agricultural Adjustment Act of 1933 attempted to increase prices at the farm level by promoting voluntary reductions in production, financed through the use of processing taxes. The Supreme Court invalidated these key provisions of the Act in 1935. One of the principal reasons was that the Act was judged to be designed to benefit a particular group, rather than to promote the general welfare. The short period that the legislation was in force had witnessed a significant increase in farm income, which was 50 percent larger in 1935 than in 1933; roughly half of that increase was estimated to be due to the Act (USDA, 1984).

In some parts of the country, the economic position of farmers remained extremely depressed. During the early 1930s, a severe and prolonged drought combined with over-plowing and over-grazing to create dust storms in the Great Plains region of the United States. By 1934, the U.S. Department of Agriculture reported that roughly 35 million acres of formerly cultivated land had been destroyed; 100 million acres had lost all or most of their topsoil; and a further 125 million acres were rapidly losing their topsoil (USDA, 1934). The “Dust Bowl” created huge black dust storms that obscured the sun; the effects being felt as far east as the nation’s capital. Thousands of farmers and rural workers left severely affected areas, many migrating to California to try to find work.

The growing environmental crisis and the loss of the production control authority in the 1933 Agriculture Act combined to produce the passage of the Soil Conservation and Domestic Allotment Act of 1935, establishing the Soil Conservation Service (SCS) as part of the Department of Agriculture.⁷ A key provision of the Act was that farmers could be paid for voluntarily shifting acreage from “soil-depleting” crops that were in surplus to “soil-conserving” legumes and grasses. The legislation permitted “production control” incentives to be relabeled as “soil conservation” incentives and provided a mechanism for both reducing production and contributing to the broader social goal of reducing soil erosion. The Act also authorized the provision of financial assistance to agricultural producers for investment in a variety of conservation practices such as strip cropping, terracing, and contour plowing. The conservation provisions of the Act apparently did little to reduce crop surpluses. As a result, the 1938 Agriculture Act expanded the use of payments to promote the retirement of land that was judged to be unsuitable for cultivation.

The Second World War and its aftermath saw an expansion in the demand for U.S. agricultural products, but persistent surpluses began to reemerge in the 1950s. In response, the Agricultural Act of 1956 established a Soil Bank in an attempt to increase the amount of land withdrawn from production. Farmers of price-supported crops, such as wheat and corn, could agree to reduce the amount of land planted and receive an additional payment if that land was placed in conserving uses rather than used to produce alternative crops. The resulting land was termed an acreage reserve. All farmers were eligible to participate in a second program – the conservation reserve. That required a longer-term commitment under which land was withdrawn from production for a maximum of ten years.

As America entered the decade of the 1960s, its agriculture was in the grip of a technological revolution that rapidly increased productivity. Land diversion continued to play an important role in government efforts to control production. Thus the 1965 Agriculture Act built upon the contractual model of the Soil Bank by permitting the Secretary of Agriculture to enter into contracts ranging from 5 to 10 years to convert cropland into uses that would conserve water, soil, wildlife or forest resources; to establish or to conserve open spaces, natural beauty, or wildlife and recreational resources; or prevent air or water pollution. The 1970 Act included a program to assist local governments in preserving open space, although this was not actually implemented.

⁷ A Soil Erosion Service had originally been created in 1933 as part of the Department of the Interior. Its successor was abolished in 1994 and its functions were transferred to the Natural Resources Conservation Service.

During the 1970s and 1980s variations in the value of the dollar and the international demand for U.S. farm products resulted in substantial fluctuations in domestic prices and farm incomes. Conservation provisions continued to apply when land was withdrawn from production in an attempt to increase prices. However, growing public awareness about environmental issues began to have an impact on agricultural policy. This was reflected in the 1985 Agriculture Act through a major expansion in conservation programs. Wetland conservation provisions (the so-called “swampbuster” provisions) meant that farmers who drained wetlands in order to plant crops would lose most of the benefits available to them under USDA programs.⁸ The Act established the Wetland Reserve Program (WRP) that provided owners of eligible land an opportunity to offer an easement for purchase by the Secretary of Agriculture, i.e., landowners agreed to limit their rights on how their land could be used for a designated period, in exchange for a payment from the government. Landowners submit bids for the payment that they are prepared to accept for granting the easement. If the land and the landowner meet eligibility requirements, the USDA through its Natural Resources Conservation Service, decides which bids to accept based on the payment requested and perceived environmental benefits. Successful bidders can receive cost-share assistance to restore wetland hydrology and vegetation in order to provide a habitat for migratory birds and other wildlife, to improve water quality and groundwater recharge, to contribute to flood control and to other objectives such as the provision of open space. The landowner retains the right to hunt and fish, manage timber production and harvesting, and can sell any mineral rights, providing that these actions do not undermine the objectives of the WRP easement.

Under the 1985 Act, farmers and ranchers were required to develop and implement conservation plans designed to protect highly erodible cropland in order to receive farm program benefits (the so-called “conservation compliance” or “sodbuster” provisions). The Act established the Conservation Reserve Program (CRP) – essentially a revamped version of the program originally introduced in the 1950s – under which producers receive annual payments in exchange for retiring highly erodible and other environmentally sensitive lands from production and establishing protective cover on those lands.

The Act also provided matching funding for the states for the purchase of development rights from farmers. The development of these types of programs at state and local levels is discussed below.

The 1985 Act represented a milestone in the inclusion of broader environmental concerns, beyond those relating to soil erosion, in U.S. agricultural legislation. The trend was continued in the 1996 Act through the establishment of several new programs. The most significant of these is the Environmental Quality Incentives Program (EQIP). This program encourages farmers and ranchers to adopt farming practices that reduce environmental damage associated with production. Participants develop conservation plans that may involve changes in cropping systems, grazing management, manure, nutrient, pest or irrigation management and land use that are

⁸ The Tax Reform Act of 1986 also reduced incentives for the conversion of wetlands to agricultural use by eliminating the preferential treatment of capital gains and placing restrictions on the expensing of farm drainage investments.

designed to improve soil, water, and related natural resources, including wetlands and wildlife habitat. If these plans are accepted, participants receive payments and technical assistance. The 1996 Act also introduced the Wildlife Habitat Incentives Program (WHIP) that provides payments to landowners for the development of wildlife habitat.

Current legislation (the Farm Security and Rural Investment Act of 2002) has substantially increased funding for EQIP with the majority of the funds being targeted to livestock producers. A new Conservation Security Program (CSP), for which most crop and grazing land are eligible, pays producers for adopting and maintaining appropriate land-use practices that address soil, water, or wildlife habitat.⁹ Another new program (the Grassland Reserve Program) is designed to preserve and improve native-grass grazing lands through long-term (10-30 years) contracts and easements.

In summary, the origin of agri-environmental policies at the federal level in the United States was closely linked to non-environmental objectives. Whenever prices and farm incomes were under pressure, the short-term diversion of land to conserving uses played an important role in attempts to support prices and incomes. The primary emphasis has been on the provision of incentives for farmers to adopt desired practices; there has been a reliance on voluntary cooperation to solve the environmental problems associated with agricultural production. Since the 1980s, broader environmental issues have come to play an increasingly important role in agricultural legislation. Provisions have been oriented to bribing or rewarding farmers to divert environmentally sensitive land to alternative uses or more recently to adopt improved management practices on land that remains in agricultural production.

Regulatory Policies

Beginning in the 1970s, particularly in response to Rachel Carson's book *Silent Spring* (1962) and Garrett Harden's *The Tragedy of the Commons* (1968), there was growing recognition in the United States of the threat of environmental degradation. The Environmental Protection Agency (EPA) was established at this time. Since then, agriculture has been affected both directly and indirectly by legislation administered by the EPA, particularly in relation to water quality, human health and safety, and bio-diversity. In contrast to the emphasis on incentives in agricultural legislation, much of the new legislation relied on command and control as mechanisms to promote environmental objectives.

Concerns about the effect of agriculture on water quality, and other environmental aspects stemmed in large measure from the postwar trend towards more intensive use of chemicals stimulated by the development of synthetic organic pesticides, inexpensive technologies for producing nitrogen fertilizer, and new crop varieties responsive to such fertilizer. The declining costs of chemical inputs and rising relative prices of other inputs, created strong substitution incentives. Government

⁹ Lichtenberg (2004a) argues that these green payments to subsidize conservation on working farmland are driven largely by some new but likely enduring political currents. Environmentalists have argued for conservation subsidies to address non-point source pollution problems that are exacerbated by traditional price and income support programs. Such payments may, however, worsen ambient pollution damage by subsidizing the expansion of intensive crop cultivation which can only be avoided by careful, but difficult to implement, targeting.

policies also contributed to the trend by supporting agricultural prices and funding public research aimed at intensification.

In 1970, the administration of the Federal Insecticide, Fungicide and Rodenticide Act, originally passed in 1947, was put under the control of the EPA. This was the beginning of a shift in federal policy from an emphasis on the control of pesticides to ensure quality and safety in agricultural uses, to a more general focus on the reduction of risks to human health and the environment. The change in focus was reflected by the passage of the Federal Environmental Pesticide Control Act in 1972 (FEPCA), which specified application methods and standards of control in greater detail.

Congress passed the Federal Water Pollution Control Act Amendments of 1972, which as amended in 1977, became known as the Clean Water Act. The Act, administered by the EPA, made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. Under the Act, animal feeding operations over a certain size (2,500 hogs, 1,000 beef cattle, 700 dairy cows, or 100,000 chickens) are designated concentrated animal feeding operations (CAFOs) and are subject to permits. The Act also requires permits, administered by the Corps of Engineers, to be obtained before any work or construction involving wetlands can be performed. To obtain a permit, builders must agree to restore, enhance, or create an equal number of wetland acres, generally in the same watershed, as those damaged in or destroyed in the construction project. A non-point source program that was established under amendments in 1987 requires states to develop non-point-source management programs. These can include regulatory measures, but usually emphasize voluntary actions. A number of watershed projects have been established under this program, involving local, state, and federal stakeholders.

Amendments in 1990 to the Coastal Zone Management Act of 1972 created the first federally mandated program requiring specific measures to deal with agricultural non-point sources of pollution. Each of the 29 states and territories with an approved coastal zone management program are required to submit details of measures to be taken to manage non-point source pollution and to restore and protect coastal waters to the EPA and to the National Oceanic and Atmospheric Administration. Key provisions for agriculture relate to sediment and erosion control, the discharge of waste from confined animal facilities, other than those covered by the Clean Water Act, nutrient management (application of animal waste to cropland), integrated pest management, grazing management to protect watercourses, and the management of irrigation. States can use voluntary incentive mechanisms such as education, technical assistance, and financial assistance, but must be able to enforce management measures if voluntary approaches fail.

In 1973, Congress passed the Endangered Species Act (ESA) with the aim of sheltering threatened or endangered species from the effects of human activity on public and private land. As of September 1, 2004, 989 species of plants and animals were listed as endangered and 276 were listed as threatened.¹⁰ A landowner whose land contains a species of plant or animal that has been placed on the endangered species list must apply for a permit if her/his land-use activities are likely to result in a

¹⁰ http://ecos.fws.gov/tess_public/TESSBoxscore

“take” of a threatened or endangered species.¹¹ In order to obtain a permit, the landowner must submit a habitat conservation plan that indicates measures to be taken by the landowner to minimize or mitigate impact. The prohibition against a take of endangered or threatened plant species on private land does not apply, but restrictions do apply to animals. Agriculture has been affected by the Act, for example, through limitations placed on the use of water for irrigation to protect threatened or endangered species of fish.

State and Local Policies

The conservation component of federal farm legislation is often viewed to be the centerpiece of U.S. agri-environmental policy, but this overlooks the vast amount of discretion over these issues devolved to state governments and, in turn, to the thousands of local governments across the country (Bills and Gross, 2004). Almost from the beginning, the voluntary approach contained in early federal legislation on conservation was fostered at the local level through the creation of “conservation districts”. In 1936 the SCS published a model soil conservation district law. Such a law, implemented at the state level, would allow local landowners to form a conservation district with the aim of implementing local, collective approaches to conservation issues. President Roosevelt wrote to the governors of the states urging them to adopt such legislation. Resulting action created one of the few continuing initiatives of the period. Currently there are almost 3,000 conservation districts with more than 15,000 volunteers serving on their governing boards, working with more than 2.3 million land managers that control more than 778 million acres of land (National Association of Conservation Districts).¹²

The late 1960s and early 1970s also witnessed the beginning of state and local legislation related to farmland retention. While growing concern about environmental degradation had trickled down to state and local levels, the list of policy goals offered in support of legislation to retain land in agriculture was much more extensive than the limited range of national priorities, such as soil conservation, water quality, and human health. A number of common policy themes figure in state and local initiatives. These reflect the ever increasing demand, particularly for land and other natural resources, for non-agricultural uses in densely populated areas. An examination of legislative intent might lead one to believe that state and local governments in the United States recognized the multifunctional nature of agriculture long before the term was widely used.¹³

It is perhaps not surprising that much of the focus of these initiatives has been on farmland retention and preservation at the rural-urban fringe. As Barkley (2001)

¹¹ “Take” is defined in the Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a threatened or endangered species. The Fish and Wildlife Service in the Department of the Interior is primarily responsible for the administration of the Act, with the National Oceanic and Atmospheric Administration in the Department of Commerce sharing responsibility for some marine species.

¹² Conservation districts are referred to several names under various state laws with soil, soil and water, resources, natural resources, or land appearing in their titles.

¹³ In a recent report by the Economic Research Service, USDA, Hellerstein *et al.* (2002) list five major legislative intents of state farmland retention programs: orderly development, food security, local economy, environmental services, and protection of rural amenities (Table 1a). This latter category is divided into four sub-categories: open space, rural/agrarian character and active agriculture, wildlife habitat/natural area, and aesthetics and scenic beauty (Table 1b).

argues: “[i]f urban areas are ‘unnatural’ because they manifest human activity, then they must be stopped or rationalized to make their growth consistent with the needs of a broader and environmentally correct plan” (p. 6). In this regard, he suggests that rationalization of planning is best carried out at the rural urban fringe, with object of concern being on the conversion or preservation of agricultural land. The “...carnage [of our natural heritage] can be stopped by imposing restriction on who converts the land, where it is converted, and what the conversion will yield” (Barkley, 2001, p. 6).

While most state legislation stops well short of direct controls on the conversion of agricultural land to other uses, all states have enacted legislation to retain land in agricultural production. Laws range from right-to-farm laws that protect farmers from certain legal actions against normally accepted farming practices, to zoning for agricultural purposes and the creation of agricultural districts (see below). Virtually all states also provide for property tax relief through agricultural value assessments or exemptions or through circuit breakers (limitations on property tax payments) linked to income. Some state and local governments are involved in programs authorizing the purchase or transfer of farmland development rights. There is an increasingly important contribution to agri-environmental efforts by not-for-profit conservancies and land trusts, organized under federal and state statutes.

Agricultural Districts. Currently, 16 of the 50 states have legislation authorizing the formation of agricultural districts (Table 1a). The concept of agricultural districts grew out of attempts to shelter farmers from escalating property taxes, particularly in areas where development pressures were inflating land values. The Williamson Act, passed by the California Legislature in 1965, authorized local governments to designate land areas called agricultural preserves and gave them the authority to assess farmland at its “use value” to encourage the continuation of agricultural production activities within the boundaries of the preserve.

At about the same time, the Governor of New York appointed a Temporary Commission on the Preservation of Agricultural Land. The Commission was instrumental in refining the concept of an agricultural district prior to the enactment of New York’s agricultural district law in 1971.¹⁴ As in California, the New York law was designed to identify areas where farming is a priority land use and to take steps to improve the prospects for retaining land in agriculture. The New York law, because of its longevity and the substantial state and local efforts to ensure its implementation, has served as a model for similar laws in other states. While provisions vary, those in New York illustrate the ways in which states have sought to promote the retention of land in agriculture.

The New York law requires that an agricultural district consist predominantly of viable agricultural land and that its formation is consistent with state and local comprehensive land-use plans and policies. The provisions are designed to facilitate the retention of agricultural land in three ways (Boisvert and Bills, 1986). First, the law restricts many of the options open to local governments whose boundaries overlap those of agricultural districts. District authority, for example, may supersede local

¹⁴ The Commission’s work also led to legislation granting farm owners a 5-year property tax exemption on land improvements for agricultural production. This increases the profitability of new farm investments and recognizes the importance of such investment in a state whose agriculture is dominated by capital-intensive dairy and specialty crops.

ordinances that regulate farm structures or practices beyond the normal requirements of public health and safety. Within an agricultural district, the right of government to acquire farmland by eminent domain (the right to acquire private property for public use) and the right of public agencies to provide funds for public facilities that encourage non-farm development are constrained.

Second, state agencies must modify their administrative regulations and procedures to facilitate the retention of agricultural land, consistent with standards for health, safety and the protection of environmental quality. These provisions are designed to promote a more stable environment for farm operations and to reduce non-farm competition for scarce rural land resources and the uncertainties that can lead to gradual disinvestment in agriculture. Farmers whose land is in an agricultural district may also avoid some of the increased costs of production required to comply with local ordinances.

Finally, the New York law can provide direct monetary benefits to farmers who are willing to participate in a district for an extended period of time. Special use districts that overlap an agricultural district are restricted in the imposition of benefit assessments or special *ad valorem* levies on farmland within the district. In addition, landowners of 10 or more acres generating average gross sales of at least \$10,000 in the preceding two years may make an annual application to pay property taxes on a value assessed as if the land were used strictly for agricultural purposes. Owners are not taxed on that part of the value of their land that is attributable to speculative or developmental purposes, but solely with respect to its capacity to produce agricultural commodities. This is the “use-value assessment” feature of the law. If land receiving this exemption is converted to a non-agricultural use, a rollback tax is applicable to the preceding five years or the number of years for which use values applied, whichever is less.

Right-to-Farm Laws. As urban and suburban growth takes place in farming areas, new non-farm residents often complain about dust, odors, noise, and the use of animal wastes and agricultural chemicals. In some cases, these new neighbors seek relief through legal action against farm operators.

Legislatures in 48 states have enacted right-to-farm laws (Table 1a) to provide options for farmers in defense of such action. Specifically, new residents who change property use near a farm cannot use nuisance laws to prevent existing agricultural practices. However, such laws are not designed to shield a farmer from legal disputes with neighbors or to establish farming as the local land use priority. The commonly stated rationale for these laws is that by strengthening a farmer’s case in court or reducing the likelihood of facing future legal actions, he or she will be encouraged to make new investments or take other measures to promote the viability of farming. Proponents of such laws see them as an integral part of a larger incentive package needed to nurture the agricultural base of rural communities that are experiencing population growth.

State laws vary, but none gives farmers a license to pursue their activities without regard to the impact on neighbors; unreasonable or negligent farming practices are not protected under right-to-farm laws. Some states go so far as to authorize their state Commissioners of Agriculture to define “generally acceptable farming practices” (Bills and Boisvert, 1993).

Some state laws explicitly exempt concerns over water resources—particularly changes in water quality due to crop or livestock production. Some provide for protection from both private and public nuisance, but many apply only to proceedings that seek to declare a farming activity as a private nuisance. The scope of nuisance protection is often contentious, especially when there are changes in farming operations, such as in the mix of or volume of commodities produced, or in the type of production technology used. Finally, some state laws explicitly allow for right-to-farm protections to be superseded by local regulations or ordinances.

The tension between state and local interventions in the use of rural land may partially explain the proliferation of local pro-agriculture, right-to-farm legislation. A common theme in local laws and ordinances is the reaffirmation of the importance of agriculture to the local community (Bills, 1996). As discussed below, the effect of these local laws on local agriculture or the viability of local communities is unclear.

Agricultural Use-Value Assessment. As for agricultural districts initiatives, use-value assessment laws adopted by all but a couple of states (Table 2a), vary in administration, definitions of eligibility, determination of the use values, and penalties for premature withdrawal from the program. This diversity is reflected in a 1987 review of the use-value assessment of agricultural land for the northeastern states (Tremblay *et al.*, 1987).

Use-value assessment programs are generally administrated by town and/or county tax assessors who receive and process applications, determine eligibility, determine the use-value for individual parcels, and calculate withdrawal penalties. Generally, two types of criteria are used to establish eligibility: a minimum acreage requirement and a minimum requirement on the gross sales of farm products from the land parcel.

Procedures used to determine use values are based on an attempt to calculate capitalize annual net income (perhaps as reflected in rental incomes) per acre or on the sale of comparable properties — the latter being particularly problematic in urbanizing areas where non-farm influences affect the sales price of farmland. In the northeastern United States, the capitalization approach is also problematic because land is heterogeneous and most rental markets for farmland are thin. To help local assessors overcome these problems, state agencies typically provide direction or assistance. In some states, state agencies determine suggested values; in others values are mandated at the state level. In most cases, there is some attempt to differentiate use values by land use or a land classification system that reflects differences in productivity.

States also differ in the frequency with which landowners must reapply for use-value assessment. In some states an application must be made each year, while in others reapplication is needed only when the land has been sold or the use has been changed. In states where land must remain in agriculture for a specified period of time to be eligible for use-value assessment, there are penalties for premature conversion to nonagricultural uses. In some states, this is a roll-back provision to recapture some of the taxes foregone, while in other states, there is a transfer tax penalty, generally expressed as a percentage of the sales price.

Agricultural Conservation Easements. These types of easements place permanent or long-term restrictions on individual parcels of land to prohibit urban development. While retaining ownership of the land, owners sacrifice development rights and in return receive an economic benefit — cash or cash equivalent and/or an income tax deduction. There are three general methods for acquiring easements.

Programs that authorize the purchase of development rights (PDR) have been adopted in 23 states, many of them in the Northeast (Table 1a). These programs place a permanent restriction on development in return for direct compensation to the landowner for the value of development rights. The value of these rights is typically determined as the difference between the market value of land, and its value in continued agricultural production.

There is considerable diversity among state agencies in the selection criteria for the purchase of development rights. Most states consider land quality, while others rely on the Land/Evaluation and Site Assessment system (LESA) developed by USDA (USDA, NRCS). Others place emphasis on land under direct pressure for non-farm development. Parcel size is sometimes a consideration; the scenic quality of alternative parcels is important in New England, and a few other states (Libby, 2003).

Another form of easement involves the transfer of development rights (TDR), and these programs exist in 15 states (Table 1a). The programs facilitate the retention of farmland by allowing landowners in “sending areas” to transfer development rights to “receiving areas” where growth is desired. These types of arrangements may be imposed on developers who wish to develop at higher densities than allowed by zoning regulations in the receiving areas. The price of TDRs is negotiated between buyers and sellers.

Although a significant number of states have authorized these types of programs, their use is largely confined to areas within a state where development pressures are particularly intense. The primary reason is the expense involved, particularly for PDR programs financed with state or local funds.¹⁵

In part because of the costs involved in the purchase of development rights, land trusts and other non-governmental organizations (NGOs) are now significant players in the acquisitions of easements. Such organizations are in a better position to accept an outright donation or charitable contribution of development rights by landowners that result in federal (and in many cases state) income tax deductions.¹⁶ In addition, participation is voluntary. Typically a price is determined through an appraisal process based on comparable sales, an estimate based on the value of the land with and without the easement, or a points-based system through which value is based on

¹⁵ It is only recently that the federal government has become involved in assisting the purchase of development rights (Hellerstein *et al.*, 2002). Established as part of the 1996 FAIR Act, the Federal Farmland Protection Program (FPP) provides funding to state, non-government organizations (NGOs), local governments and tribal entities that have existing farmland protection programs. By funding up to 50 percent of the fair market value of the conservation easement on privately owned farmland, the FPP spent about \$50 million to protect about 107,000 acres, with a total easement value of \$190 million. In the 2002 Farm Security and Rural Investment Act, funding was expanded to about roughly \$100 million per year for the six-year life of the Act.

¹⁶ There can also be important estate tax implications of donations of development rights.

various land attributes (Libby, 2003). Reaching an agreement on the value of the land may be time consuming and often involves significant transactions costs.

Not all land trusts have a specific interest in agricultural land, but those that do are a significant force in the states concerned; they often work closely with state agencies, particularly in the eastern United States, where it may be the state that holds the easement. In other states, particularly in the West, land trusts are the primary holder of easements. In such states, farmers are reluctant to reduce their options by selling development rights, and are concerned that programs may change in midstream (Sokolow *et al.*, 2003). Others may be concerned about the longevity of land trusts, their stability and the evenness of enforcement.

Agricultural Zoning. Currently, 24 states have zoning that is termed “agricultural” (Table 1a), but in most cases, there is reliance on minimum lot size to discourage development in areas identified as agricultural. Only a handful of states have county zoning ordinances that establish permitted uses that are consistent with active farming (Libby, 2003).

Zoning authority is one of the few examples of a command and control approach at the local level in the United States designed to affect farmland retention. In addition to concerns about efficiency, agricultural zoning has been attacked on grounds of fairness. It is essentially a “taking” issue: is it fair to remove development potential through regulation that requires the landowner to bear the full cost of providing the public benefits from farmland protection? In reality, however, zoning amendments are granted routinely, and many agricultural zones end up being holding zones for future development with permitted uses that have little to do with agriculture.

4. An Assessment of U.S. Agri-Environmental Policies

To provide a comprehensive assessment of the effectiveness of such a diverse collection of agri-environmental policies pursued at the federal, state and local levels would be a formidable task. We make no attempt to develop quantitative estimates of the effectiveness of U. S. agri-environmental policies. Rather, we assess the appropriateness of the various policy instruments used within the context of the policy paradigm that we have suggested earlier to deal with multifunctional agriculture (Blandford and Boisvert, 2002). In such an assessment, we must recognize that because agriculture is a resource extractive industry, production occurs primarily under uncontrolled natural conditions characterized by spatial heterogeneity and temporal variability. Thus, the performance of policy instruments depends on local factors such as soil and field conditions, weather, and management skills of the farmer. Under these conditions, it is difficult to generalize about environmental problems in agriculture and the effectiveness of policy instruments. These conditions place a premium on bringing the agricultural and environmental sciences to bear in policy design so that programs can be targeted effectively (Antle and Wagenet, 1995; Wu, 2004).

Policies to Promote National Agri-Environmental Priorities

To begin our assessment, it is clear from the history of U. S. agricultural conservation programs at the federal level that spending has been closely linked to developments in commodity markets (Heimlich and Claassen, 1999). Since land retirement programs have primarily been designed to reduce surpluses, expenditures have always peaked

shortly after large drops in agricultural prices. It was not until the agricultural recession of the early 1980s that eligibility, under the newly created CRP, was targeted to highly erodible land, although land held by traditional participants was also included. For the first time, farm commodity program benefits were tied to performance on vulnerable lands, forcing farmers to compare commodity program benefits with the cost of compliance with conservation programs. As we moved into the new millennium, the CRP had compensated landowners for the retirement of over 37 million acres of highly erodible cropland at an annual cost of about \$1.8 billion or about \$48 per acre per year (Wu *et al.*, 2000).¹⁷

Until 1990, the objectives of the CRP remained largely limited to supply management and soil productivity. There was evidence that the operation of the program was more consistent with maximizing the number of acres enrolled than with maximizing environmental benefits (Reicheldefer and Boggess, 1988). It was not until the 1990 Farm Act that the environmental objectives of CRP were broadened to include water quality and wildlife habitat goals.¹⁸ Further, older conservation programs were consolidated under EQIP. Although income support payments were decoupled from production decisions in the 1996 Act, the leverage for conservation compliance remained.

The administration of the CRP was also modified to stress its other “environmental” goals, and to move towards enrollment based on benefit-cost targeting (Wu *et al.*, 2000).¹⁹ This was to be done in part by considering the environmental contribution of particular land parcels, through the calculation of an Environmental Benefits Index (EBI), as well as the cost of selecting those parcels for enrollment in the CRP (Jaroszewski, 2000).²⁰ Similar procedures are used in the Conservation Reserve Enhancement Program (CREP). These programs are established at the state level to

¹⁷ As of 2000, almost 60 percent of CRP acreage was concentrated in the center of the country—from the Dakotas to the panhandle of Texas. Another 18 percent was in the western corn-belt states. About 77 percent of the CRP acreage was in existing grass cover or new grass plantings, while the remainder was under a variety of conservation practices, ranging from tree cover, to wildlife habitat, to buffer strips and wetland restoration. Many of the existing contracts are due to expire between 2007 and 2010 (Smith, 2000).

¹⁸ Boisvert (2001a, b) argues that by compensating landowners sufficiently to retire land from agricultural production, the CRP seeks to sever the joint relationship between food output and non-commodity outputs associated with soil conservation and environmental quality. Through these payments, it becomes sufficiently profitable to engage in the production of public environmental outputs separately from agricultural output. Agricultural output continues to be produced jointly with some implied level of environmental quality on land remaining in production. If the program is effective, production is concentrated primarily on land that is less erosive and of less value from an environmental standpoint. It is still true, however, that on the land retired from agriculture; the several environmental benefits attributable to CRP remain, in themselves, jointly produced.

¹⁹ Babcock *et al.* (1997) document the tradeoffs between particular environmental benefits under different targeting rules.

²⁰ The EBI is based on: a) wildlife habitat benefits; b) water quality benefits from reduced erosion, runoff, and leaching; c) on-farm benefits of reduced erosion; d) long-term retention benefits; e) air-quality benefits from reduced wind erosion; f) location in a state conservation priority area (CPA); and g) cost of enrolling the land. There is considerable discretion at the local level on the weights given to each of these factors in the index, but the weight given to the cost of enrolling is withheld from potential participants, probably to avoid any possibility for gaming of the bidding process. From a theoretical point of view, the EBI implicitly assumes that the social value function is separable in the individual attributes (Shortle and Dunn, 1986).

target priority areas. CREPs offer greater financial benefits to landowners; state and federal governments split the cost of the program.

It is clear that with these recent changes, conservation expenditures are no longer linked directly to efforts to reduce agricultural production. Through the use of the EBI in the enrollment process, progress has been made toward maximizing environmental benefits per dollar of expenditure.²¹

This change is clearly consistent with a policy paradigm that both recognizes explicitly agriculture's critical role in the supply of highly valued non-commodity outputs, and compensates landowners based on the value of outputs to society (Blandford and Boisvert, 2002). In doing so, however, Wu (2004) points to some remaining difficulties in targeting, particularly the need for explicit consideration of threshold effects, ecosystem linkages and spatial connections between ecosystems. To account for these complexities, he argues for a two-step approach: first, allocate funds to each geographical area (watersheds in the case he discusses) to ensure thresholds are met and second, target funds within each area to maximize benefits.²² Clearly, the implementation of such a scheme would require information about the tradeoffs among alternative environmental benefits and their social values. This is a rather daunting task; particularly in light of the conceptual problems mentioned above about valuing jointly produced non-market goods.

Although the CRP is perhaps the centerpiece of U. S. agri-environmental policy, policies that promote soil conservation and other environmental benefits by paying farmers to divert erodible land or cost sharing of conservation practices can hardly be effective in dealing with the broader problems of environmental degradation. We know that each policy objective must be addressed with a separate policy instrument. To address the broader range of environmental objectives that affect other sectors of the economy as well as agriculture, the EPA and other environmental agencies have relied on regulation. Thus, any assessment of policy measures to deal with the multifunctional non-commodity outputs from agriculture must consider how well this alternative approach can be adapted to the conditions within production agriculture.

Lichtenberg (2004b), argues that while regulation, combined with technological fixes, such as scrubbers on smokestacks and biological processes to clean wastewater, is effective in dealing with point sources of pollution, it is more problematic to apply such an approach to agriculture because of the local scope, spatial heterogeneity and temporal variation of pollution. He reminds us that "... we know from general principles that the greater the degree of heterogeneity among firms, the greater the superiority of incentives over regulation" (Lichtenberg, 2004b, p.29). Furthermore, through direct application of Weitzman's analysis of the efficiency of price and

²¹ It is estimated that off-farm benefits from the CRP substantially exceed on-farm benefits—with water quality benefits topping the list—but some important economic benefits have yet to be measured (Smith, 2000). Osborn (1997) compared the expected environmental benefits and contract costs of CRP implementation before and after passage of the 1990 FAIR Act and concludes that the targeting of offers clearly improved the program's cost effectiveness. Claassen *et al.* (2001) also point to the benefits of targeting through use of the EBI.

²² From a theoretical point of view, optimal targeting would require that marginal rate of substitution between benefit a and benefit b in watershed i be equal to the marginal rate transformation between the production of benefit a and benefit b in watershed i. The marginal social values of each benefit must also be equated across watersheds (Wu and Boggess, 1999).

quantity regulation to agriculture, it is likely that if farmers can respond to temporal variability, incentives are preferred to direct regulation unless environmental damage is much more responsive to temporal variation than is agricultural production (Weitzman, 1974; Stavins, 1996; and Lichtenberg, 2002). Although there are distinct advantages to incentives over direct control in an agricultural production environment, not all incentives are created equal. Subsidies, or green payments such as those involved in EQIP or the new CSP, are attractive for those wishing to continue to support agricultural producers. However, such subsidies may provide incentives to expand production on land that is even more environmentally sensitive. And, unless subsidies are tied directly to verifiable changes in the landscape or production techniques, desired outcomes are largely unenforceable. Finally, in a time of increasing emergency, disaster, and ad hoc forms of support to farmers, federal budget constraints may prevent continued expansion of funding for such subsidies (Smith, 2004).

Lichtenberg's (2004b) line of reasoning suggests a preference for pollution taxes or taxes on inputs whose use is highly correlated with environmental degradation, although he recognizes that these measures may also not be fully efficient for non-point source pollution. Despite these limitations, he believes that pollution taxes would perform quite well, and before rejecting them for this reason, warns against falling victim to the common Washington adage: "it is important not to let the perfect be the enemy of the good" both in program design, and in evaluation (p. 30). Lichtenberg is particularly optimistic about the application of his approach in the case of pesticides because environmental damage correlates highly with pesticide formulation and application—suggesting differential taxes on different formulations of the same active ingredient. Erosion could also be handled in a straightforward way because this typically varies with land and soil characteristics, crops, and production practices—all of which are observable at relatively low cost. In contrast, the control of nutrient runoff and leaching is more problematic because taxes would need to be specific to land quality, crop, location, and season. Since the same fertilizers are used for different crops, it would be impossible to assess differential taxes at point of sale or to use yields that may vary for many reasons, as a basis for differential taxes. Lichtenberg concludes that the central difficulty in deriving creative efficient policies to control nutrient residuals is the sheer number of dimensions of variability.

State and Local Policies

The variation in state and local policies to promote agri-environmental and other multifunctional objectives of agriculture complicates an assessment of the effectiveness of these policy instruments. Through the development of electronic technology for data collection, retrieval, and storage, there has been an improvement in our ability to track the extent and cost of participation in agricultural districts, use of right-to-farm laws and use-value assessment, and the purchase of agricultural easements. It is much more difficult to determine quantitatively the return to these expenditures in terms of the variety of multifunctional objectives used to justify the legislation.²³

²³ Heimlich (2001) puts the task of evaluating the impact of these policies in the same class as the more general problem of building causal models of land use change—a task that has met with modest success at best by all economists, planners, and regional scientists who have attempted it. These efforts are generally confounded by the dynamics, timing, and uncertainty surrounding the change, the degree

We know least about the effect of right-to-farm laws. As stated above, proponents of such laws see them as an integral part of a package of incentives to nurture the agricultural base of rural communities experiencing population growth. Bills (1996) argues that the impact on local agriculture or the economic viability of farm businesses is unclear. At least in New York and the Northeast, there is little data on the rate of occurrence of legal disputes involving the general population and farm businesses, or on the nature of such disputes. He argues "...the impetus for right-to-farm law has been propelled by anecdote and discussion of just a few high-profile cases" (Bills, 1996). What is clear is that in common with virtually all segments of American society, farm operators and their neighbors are turning to the courts with increasing frequency to resolve conflicts over land use.

In contrast, we have data about some aspects of agricultural districts. For example, of the 12 states that had active agricultural districts in 1997, there were over 31 million acres enrolled, although the extent to which farmers take advantage of these programs varies widely (American Farmland Trust, 1997).²⁴ Over 93 percent of the acres enrolled are in four states, with more than three-quarters of the total in the two states with the earliest programs – California and New York. Unfortunately, there is little evidence that the creation of districts has been responsible for the retention of land in agriculture. All that we know is that through the various enrollment criteria, states try to limit enrollment to areas that are: in or near viable farming areas; compact and consist of contiguous parcels; consistent with stateside agricultural preservation strategies; form a critical mass of farmland needed to ensure the continuation of agriculture; and have the potential to generate environmental benefits (American Farmland Trust, 1997).

Clearly the intent of the creation of agricultural districts is to place limits on where growth can occur and to identify where agriculture has primacy. In practice, however, urban growth boundaries function well only when there is an ample supply of land that can be developed. As such land is exhausted, at some point development can spill over. Similarly, agricultural districts work well when the surrounding area is mostly rural, but often begin to break down as they become more and more isolated and surrounded by development (Heimlich, 2001). Only time will tell, the extent to which agricultural districts will be effective in the retention of farmland.

There is also little evidence, at least that we have been able to uncover, about the effectiveness of agricultural zoning. As stated above, and in contrast to agricultural districts, zoning changes the rules under which land can be developed, but as with any other type of zoning, variances and appeals are the norm. Thus, zoning is fungible, and so is the land use that is governed by zoning laws. Despite these drawbacks, Libby (2003) argues that future farmland retention policy will likely emphasize "...*both* more effective zoning to establish that farming is the 'highest and best' use

of abstraction often necessary in any attempt to model such change, and the inability to control for the influence of other economic changes.

²⁴ It is tempting to conclude that all land in agricultural districts is farmland, although this is not the case. In most states, there is minimum size for districts, and an attempt is made to ensure that much of the land in districts is cropland, or at least land in farms. However, the reality is that minimum size restrictions could hardly be met through enrolling only contiguous parcels of farmland. In New York, for example, efforts are made to ensure that at least half the land in districts is viable farmland.

for some lands, and market-type devices that enable a farmer to realize the development value inherent in some open land” (p.7). He argues that zoning can protect or even expand opportunities for owners of farmland by avoiding the potential economic burdens imposed by thoughtless development patterns. He further suggests that agricultural zoning, properly administered in conjunction with voluntary agricultural districts, can effectively identify areas with future farming potential, and even perhaps serve as sending areas for TDR programs.

The permanent easements obtained through PDRs, TDRs or charitable donations are perhaps the only enduring legal instruments that are rarely reversed in practice. While land may not be developed under these conditions, the effects of easements on the viability of agriculture may be diminished as land parcels become more and more isolated over time. The long-term effectiveness of these legal instruments in the retention of agriculture can be enhanced by obtaining easements for a critical mass of land suitable for agricultural production. Creating such a critical mass can be very expensive, but without it, the land may ultimately move into other open space uses. Under these circumstances, easements may no longer be effective in retaining land in agriculture, but the open space may still provide a valuable collection of multifunctional benefits.

Although expensive, a substantial amount of land has been involved in the various programs around the country. Wu *et al.* (2000) report that the Nature Conservancy has protected 11 million acres of environmentally valuable land through purchase or donation, although they do not provide an estimate of the costs involved. In the 46 programs in 15 states that were the subject of a recent joint study by the American Farmland Trust and the Agricultural Issues Center of the University of California, a total of \$1.8 billion was spent to protect 887,000 acres on 5,800 farms (Sokolow and Zurburg, 2003). On a per acre basis, the cost was just over \$2,000. There have been numerous studies that attempt to place a value on the amenity benefits from farmland and open space, and as one might imagine, the estimates differ widely based on methods used, the locality studied, and between rural and urban residents (e.g., Johnston *et al.*, 2002; Bergstrom and Ready, 2004). Studies also suggest that people’s willingness to pay for farm-specific amenities can be substantially higher than for generic rural amenities (see Irwin *et al.*, 2003 and the references cited therein). It is perhaps only coincidence that some hedonic estimates from the 1990s of the average willingness to pay for the contribution of farmland’s amenity benefits to residential land values are nearly \$1,800 per acre (Bergstrom and Ready, 2004). This may suggest that the \$2,000 per acre price for easements to protect farmland is broadly consistent with the social value of the non-commodity outputs they provide.²⁵

Use-value assessment programs are the only other programs that provide direct financial benefits to farmers that agree to keep their land in agriculture for some period of time. Unfortunately, these programs are subject to a form of “free riding”, providing benefits to landowners with no thought of selling their farmland or

²⁵ Lynch and Lovell (2002) clearly demonstrate that the price that must be paid for these easements varies by area and, as expected, is much higher in highly urbanized areas. There is some evidence that the easement has little effect on land prices in urban areas (Nickerson and Lynch, 2001). These authors cite several possible explanations. Their finding certainly has implications for potential future participation, the amount offered for the easements, and for farmers who wish to buy the land for agricultural purposes.

converting it to non-open space uses. Additionally, the cost of these programs to local governments, particularly in rural areas, can be substantial.²⁶ Furthermore, in these areas, a large share of the property tax burden can be shifted to the owners of non-agricultural land.²⁷ More important, in the areas where the effects of these programs have been studied, use-value assessment programs have had little or no effect on the rate of conversion of farmland to non-farm uses. The roll-back provisions on property tax benefits or other penalties for premature conversion are at best modest, and are easily counteracted by other forces affecting the markets for land in urbanizing areas.

5. International Implications of U.S. Policies

As in many other countries, agri-environmental programs in the United States have traditionally had a mixture of objectives, in addition to enhancing the supply of positive externalities and public goods and reducing the supply of negative externalities generated by agriculture. A gradual shift in emphasis has occurred from policies that primarily relied on production controls to pursue the dual objectives of supporting commodity prices and environmental aims, to policy measures that are more explicitly targeted to environmental outcomes. This trend may continue, but it seems likely that strict environmental considerations will not be the only driver of future policy, particularly in terms of the level of expenditure. There are powerful political incentives to deliver subsidies to U.S. agriculture, and to the extent that such subsidies can be seen to contribute the broader public good of improving environmental quality – that incentive is likely to persist. The level of expenditure and the conditions attached to the receipt of payments are not minor issues, particularly for U.S. trading partners or competitors, even if such payments are labeled as “environmental”. Developing countries, for example, have raised concerns about the international implications of such issues in the current round of trade negotiations under the World Trade Organization.

Federal expenditures on agri-environmental (conservation) programs have remained relatively constant in recent years (Table 2). Since 1997, annual expenditure has varied from roughly \$1.7 to \$2.1 billion. When other forms of support for U.S. agriculture have been reduced, such as during the period immediately following the passage of the FAIR Act in 1996, conservation expenditures have accounted for a significant share of total government expenditures – 24 percent, for example, in 1997. That proportion has naturally declined – to a low of 5 percent in 2000, for example – when substantial price and income support was being provided to U.S. farmers.²⁸ It is clear that there would need to be a substantial increase in the financial resources allocated to agri-environmental programs for these to become a substitute for the

²⁶ For example, recent unpublished data for New York State indicate that there are nearly 56 thousand individual parcels of farmland that have received an agricultural use-value exemption. This encompasses just over 4 million acres with an assessed value of \$5.63 billion. Roughly 29 percent of the assessed value (\$1.64 billion) is exempt from local property taxes under the use-value provisions. In rural areas where farmland accounts for a significant fraction of the value of real property, this program can reduce the property tax base significantly.

²⁷ This effect can be mitigated if the state is willing to make payments to local governments in lieu of taxes. This shifts the cost to state taxpayers, as does a lowering of taxes to owners of farmland in the few states that offer income tax circuit breakers for that purpose.

²⁸ Note that the figures in Table 1 do not include the price and income support provided to U.S. agriculture through programs that restrict competition from imports. Estimates of total support, such as those generated annually by the OECD, are substantially higher than the figures reported here, and the percentage of total support to agriculture represented by conservation payments is therefore lower.

other forms of assistance provided to U.S. agriculture. It seems doubtful that there will be a great deal of political support for a major increase in expenditures on agri-environmental programs in the United States at the federal level, particularly given the substantial federal budget deficit.

Expenditures on the environmental programs of the United States and other countries are included under the “green box” category of support, identified as a result of the Uruguay Round Agreement on Agriculture.²⁹ The green box category was created to permit countries to provide assistance to agriculture designed to achieve a range of “non-trade” objectives, under the stipulation that green box measures should be minimally trade and production distorting. Regardless of the specific policy aims underlying the subsidies that countries choose to notify to the WTO under the green box category, there remains an issue as to whether the criteria that are applied for the inclusion of such subsidies need to be clarified. Since the production of non-commodity outputs by agriculture is invariably linked to some degree to the production of commodities, it may be difficult to satisfy strictly the minimally distorting condition that is supposed to attach to such measures (Blandford, 2001).

In this regard, policies that have a single focus, such as environmental quality, are easier to evaluate than those which purport to be directed towards a more diffuse set of objectives, such as those encapsulated by the broader concept of multifunctionality. This is particularly so when specific criteria on outcomes are used to allocate support, such as the environmental benefits indicators currently employed in the selection of land for inclusion in the CRP. That type of explicit approach makes it easier to identify not only policy objectives, but also policy outcomes and their consistency with international obligations. We would argue that the gradual movement to greater policy transparency is a major advantage of the way that agri-environmental policies have tended to develop in the United States. In contrast, it is more difficult to provide a similar assessment for policies whose aims are more loosely defined. How, for example, would one design a mechanism for assessing the outcomes of domestic policies that purport to be oriented towards the preservation of cultural heritage or landscape? In the absence of precision in objectives and an ability to assess outcomes, the risks are increased that green box measures will simply become the preferred vehicle for the general provision of subsidies to agriculture. For this reason, there is a case for strengthening the criteria used to define green box payments, and for greater scrutiny of policy measures that countries choose to include in the green box category (Blandford, 2001). It is doubtful, however, that countries who are becoming increasingly reliant on green box measures would welcome a strengthening of the international disciplines applied to these measures.

A further international issue that is highlighted by recent developments in U.S. agri-environmental policies relates to the increasing importance of local initiatives and sources of financing for agri-environmental programs. National governments (or supra-national entities in the case of the European Union) are the agents that operate

²⁹ Subsidies that are linked to production limiting measures, but are not viewed to be driven by environmental objectives, are included under the blue box category of support. Such payments are viewed to be a form of price and income support that is less distorting than “amber box” measures, but more distorting than “green box” measures. If the aim is to move away from the provision of subsidies that are designed to support prices, both amber and blue box payments would seem to be candidates for elimination.

in the WTO and are responsible for the domestic application of international disciplines. The assumption underlying the GATT/WTO process has been that national authorities are the primary source of any preferential subsidies to agriculture, and that agreements reached on the reduction of such subsidies would result in a general leveling of the competitive playing field in international markets. If the balance of funding shifts to the local level, this clearly has implications for that assumption and for the application of international disciplines. As we have indicated above, significant initiatives in the development and application of agri-environmental and related policies are taking place at the state and local levels in the United States. Federal law only provides for limitations on economic policies at the state level if these are viewed to restrict inter-state commerce, or are otherwise judged to infringe the U.S. Constitution. Many of the activities that we have discussed above could be considered to fall under the heading of “collective action”. It is extremely unlikely that the federal government would seek to limit such action, and it is therefore unclear how, if at all, the GATT/WTO framework can deal with support and assistance provided in this way.³⁰

6. Conclusions

In this paper we have sought to provide a perspective on U.S. policies for the provision of non-commodity outputs by agriculture. In the U.S. case, this has primarily involved a focus on environmental externalities and public goods. U.S. policy approaches in this area demonstrate several advantages and limitations.

One of the major advantages has been a tendency to rely on “market-based” approaches for determining the allocation of payments. This is represented most strongly in the approach used to choose the land that is enrolled in the Conservation Reserve Program, through which bids are submitted by producers and the contribution of the land offered to the achievement of environmental benefits is evaluated with respect to an established set of criteria. While this process is by no means perfect, it is clearly preferable to an approach in which a general subsidy is provided to landowners regardless of the environmental benefits that would be generated from the inclusion of their land in the reserve.

A second major advantage of the U.S. approach has been the trend towards a policy focus on the resource actually generating the externalities/public goods, i.e., the use of land-based payments, rather than trying to achieve benefits indirectly by focusing on the provision of production subsidies. It is true that the targeting of measures to achieve maximum environmental benefits has not always been apparent; particularly when environmental policy aims were linked to the aim of controlling production in order to support market prices, but the United States has tended to move away from that approach. As we have argued elsewhere, there are considerable advantages in terms of both policy effectiveness and the minimization of production and trade distortions from pursuing an approach focused on land-based payments (Blandford and Boisvert, 2002).

³⁰ Collective action is becoming an important issue in other areas, for example, in market structure and competition in agriculture. For example, the replacement of the activities of the New Zealand Dairy Board by dairy cooperatives represented a significant shift from government control of the marketing of New Zealand’s dairy exports to collective action by producers.

One negative aspect of the way that U.S. policies have developed is an excessive reliance on incentives (subsidies) to address both positive and negative externalities with little use of disincentives (taxes) to address the negatives. This is in line with a general reluctance in the United States (and elsewhere) to bear the political risks of internalizing negative externalities, and the general tendency in agricultural policy to provide assistance to farmers. We could also note that penalties for failure to comply with environmental requirements have been weakened since their original introduction in the 1985 Agricultural Act.

Finally there is an aspect of the development of U.S. policies whose implications are unclear. This is the growing importance of local action and initiatives to secure the non-commodity outputs associated with the use of agricultural land. If such benefits are primarily captured locally, e.g., those generated by the preservation of open space, then this may be a good thing. It may reflect an effective way of making operational a “willingness to pay” for the benefits generated by agriculture. However, a reliance on local action may not ensure that broader public interests are satisfied. The use of co-financing by the federal government might be used to provide incentives for local projects with high impact/returns that extend beyond the local area. Also there are likely to be advantages of federal/local partnerships in sharing know-how and the provision of technical assistance. However, as indicated earlier, the shift in the funding of support to agriculture from the center to the local level may make it difficult to exert international disciplines over the provision of support.

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Table 1a. Types of Farmland Protection Programs Adopted, No.of States, by Region									
Region-No. of States	Agricultural Districts	Agricultural Protection Zoning	Differential Assessment	PACE (PDR)	Right-To-Farm	Transfer Development Rights			
-----Number of States-----									
Northeast-11	6	2	11	11	11	7			
Lake States-3	1	3	2	2	3	1			
Corn Belt-5	3	4	5	1	5				
Northern Plains-4		4	4		4				
Appalachia-5	4	1	5	3	5				
Southeast-4		1	4	1	4	1			
Delta States-3			3		3				
Southern Plains-2			2		2				
Mountain-8	1	5	8	3	8	4			
Pacific-5	1	4	5	2	5	2			
Table 1b. Legislative Intent of Farmland Preservation Programs, No. of States, by Region									
	1 DEV	2 FSEC	3 ECON	4 ENV	5 AMEN	5.1 OS	5.2 CHAR	5.3 HAB	5.4 SCEN
-----Number of States-----									
Northeast-11	6	10	9	11	11	11	11	9	10
	3	2	3	2	3	3	1		2
Lake States-3	3	3	4	3	4	4	4	3	4
Northern Plains-4	1	2		1	1	1	1		
Appalachia-5	1	4	4	4	5	3	4	3	4
4 Southeast States		2		1	2		2	2	1
Delta States-3		1	1	2	2	2	1	1	1
Southern Plains-2		1							
Mountain-8	1	2		2	5	4	4	4	5
Pacific-3	3	3	2	3	3	3	3	2	3
48 States	18	30	23	29	36	31	31	24	30
Source: Hellerstein <i>et al.</i> (2002)									
Key to column: 1 DEV: Orderly development 2 FSEC: Food security 3 ECON: Local economy 4 ENV: Environmental services 5 AMEN: Protection of rural amenities					The rural amenities are: 5.1 OS: Open space 5.2 CHAR: Rural/agrarian character and active agriculture 5.3 HAB: Wildlife habitat/natural area 5.4 SCEN: Aesthetics, scenic beauty				

Table 2. U.S. Government Payments to Agriculture, 1997-2004

	1997	1998	1999	2000	2001	2002	2003	2004F
	\$ million							
Total	7,256	10,143	19,223	32,265	22,105	15,680	17,425	14,836
Price supports	110	1,606	4,815	9,788	8,482	9,801	4,999	2,701
Direct payments	6,450	5,675	10,728	17,555	11,886	4,214	9,680	9,516
Conservation programs	1,756	1,849	1,682	1,691	1,854	2,034	1,944	2,134
Other (net)	-1,060	1,013	1,998	3,231	-117	-369	802	485
Conservation as percent of total	24%	18%	9%	5%	8%	13%	11%	14%

F = forecast

Data are Commodity Credit Corporation (CCC) expenditures for October-September fiscal years.

Source: USDA.