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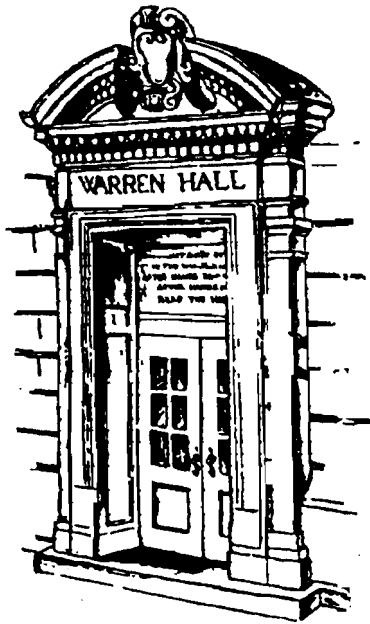
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by

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Extra-Market Values and Conflicting Agricultural Environmental Policies

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There is widespread recognition that on-farm activities have social implications that extend far beyond the boundaries of individual farms, and that markets simply do not account for the off-farm social impacts of agricultural land-use practices. Extra-market costs (e.g., ground and surface water contamination) and benefits (e.g., open space and rural landscapes) are increasingly a principal consideration in agricultural and environmental policy. Many states and localities, for example, are actively pursuing policies to protect water supplies from agricultural contamination, while separately implementing incentive programs and legal protections designed to preserve farmland. All too often these policies are inconsistent and work at cross-purposes.

Continued efforts to address both the positive and negative externalities associated with agriculture are similarly apparent at the Federal level. Most notably the recent Farm Bill, entitled the Federal Agricultural Improvement and Reform Act of 1996 (FAIR), augmented funding for environmental and farmland protection provisions with the specific mandate "to maximize the environmental benefits for each dollar expended". Yet, although created by the same statute, these environmental and agrarian programs are not coordinated. Furthermore, the voluntary nature of these Farm Bill programs are a marked and confusing contrast to the enforceable agricultural best management practices mandated by the Coastal Zone Management Act, which, if adopted, will impose substantial costs on some farms [Heimlich and Bernard].

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Agricultural environmental policy initiatives have been bolstered by economic research in the last two decades that has sought to quantify the social extra-market values associated with agricultural practices. From a policy perspective this body of research is important. It demonstrates that both the extra-market costs and benefits associated with farmland and agricultural practices are large and, thus, warrant consideration of public policy intervention. For example, an early 1980's study estimated that the national off-site costs of agricultural erosion were conservatively estimated at \$2.2 billion annually [1985, Clark]. Economic research conducted in the latter 1980's suggested that agricultural contamination of groundwater may impose billions of dollars of avoidable costs on households and communities nationwide [Lee and Nielsen]. Focusing instead on individual willingness to pay for environmental quality, valuation studies conducted at various sites over the last decade have estimated that the benefits of protecting groundwater from agricultural contamination ranges from \$56 to several hundred dollars per household per annum [1992, Boyle *et al.*]. Likewise, several amenity benefits studies of agricultural land report annual household willingness-to-pay values for protecting farmland in the one to three hundred dollar range [Poe].

Indeed, it can be argued that such research is directly related to the current set of agricultural environmental policies. The policy shift away from traditional concerns with on-site soil loss and towards off-site considerations of soil erosion was demonstrated in the Conservation Reserve Program and the "Sodbuster" cross-compliance provisions of the 1985 Farm Bill. This legislation was backed by a then emerging body of literature documenting substantial off-site water quality impacts associated with farmland erosion. Some more targeted water quality protection initiatives were introduced in the 1990 Farm Bill, again in step with a growing body

of research documenting the potential social costs of agricultural contamination of ground and surface waters. Over the years, evaluations of voting patterns on farmland protection referenda and surveys of public willingness-to-pay for preserving farmland have lent support to local, state, and federal initiatives to protect farmland.

A critical limitation of the existing extra-market valuation literature in this area is that such research tends to be myopic, and points to policies that address only one side of the agricultural environmental relationship. Although it is widely acknowledged that farmland and agricultural practices provide both benefits and costs, most, if not all, of the research focuses exclusively on quantifying either the environmental costs or the amenity benefits of agriculture. This artificial compartmentalization of extra-market benefits and costs in individual research programs engenders unilateral policy prescriptions. For instance, based on an assessment of the benefits and costs of erosion control, Ribaudo *et al.* (1994) concluded that "land retirement as a primary pollution control tool is expensive, but if appropriately targeted, could generate sufficient benefits [i.e., reduced off-site costs] to outweigh social costs." A strikingly different conclusion was reported by Lopez *et al.* (1994) who examined the amenity benefits side of agricultural land use, and concluded that "land is under allocated to agriculture." In arriving at these competing conclusions, each analysis failed to account for countervailing extra-market values that might mitigate these findings.

Importantly, agricultural environmental policy intervention reflects these research conclusions. Rather than addressing both sides of the issue in an effort to maximize societal benefits of land use, policy making at all levels has tended towards developing disconnected, and often incompatible, agricultural environmental policies. Frequently these policies seem to work

at cross-purposes. One set of policies strives to minimize the off-site costs by modifying agricultural practices. A separate set of policies is directed towards maximizing the open-space benefits associated with farm land. As discussed previously, the fact is that both benefits and costs of farmland and agricultural practices are large. And, if the goal of agricultural environmental public policy is truly to "maximize the environmental benefits for each dollar expended", then both should be considered jointly. That is, instead of two separate maximization processes, the objective should be a net benefits maximization algorithm that includes both off-site environmental costs and open-space benefits as arguments².

Moreover, the valuation literature suggests that absolute and relative benefits and costs will vary widely by region and locality. Valuation research on the off-site costs of agriculture indicates that the costs of leaching and runoff will vary substantially across sites, watersheds, and regions due to differential demands for water, existing levels of contamination, and the number and the socio-economic characteristics of people affected. Farmland protection values also vary widely across studies and regions: estimated willingness to pay for farmland protection has been found to rise with the ratio of urban to agricultural lands in the region, the degree of perceived threat to agricultural lands, type of farm protected, and socio-economic characteristics of the affected population. Combined, the evidence strongly indicates that the benefit-cost ratio associated with agricultural externalities is a mosaic. In some instances the

² It is interesting to note that the broader public does not appear to separate farmland protection from broader "environmental" objectives. Based on their own survey and focus group research, as well as that of others, Kline and Wichelns observe that the public's motivation for protecting farmland "reveals a belief among the public that environmental objectives such as protecting groundwater and wildlife habitat, and preserving natural places, should be important objectives of farmland preservation programs".

benefits of protecting farmland will be deemed large relative to off-site costs. Elsewhere, this benefit-cost ratio may be reversed.

One approach to accommodate this spatial variability in values would be to broaden existing programs through rule-making so as to make potentially conflicting policies more compatible. Along these lines, programs such as the locally led conservation movement being created around the FAIR's Environmental Quality Incentives Program might broaden ranking criteria beyond water quality and price considerations to attach priority to areas in which farmland open space is particularly threatened and valued. Farmland protection programs might similarly give preferential consideration to farms agreeing to follow best management practices as part of the easement criteria. In this manner the overall benefit maximization objectives could possibly be more closely approximated by coordinating potentially conflicting policies.

However, adopting a rule-making approach without changing the underlying philosophy and missions of responsible agencies may prove ineffective. Performance of individual agencies is often measured with respect to differing goals that are often perceived to be incompatible from the outset: for example, the mandates of environmental or conservation agencies are evaluated in terms of their success in protecting resources, whereas agricultural agencies typically view their role as promoting the well-being of the farm community. Maintaining these strict delineations is likely to perpetuate incompatibilities in policies. Clearly, interagency cooperation and consensus among agencies and staff is needed to maximize the broad social benefits of agriculture. Top level initiatives, such as the establishment of an interagency task force in New York State to cooperatively coordinate Farm Bill initiatives, state non-point source funding, and Federal water acts, as well as less formal information exchange groups among staff offer a means

of addressing this need.

Of a more fundamental nature, joint consideration of benefits and costs suggests a transformation of property rights allocations and public policies associated with these rights. For the most part, as indicated in the upper panel of Figure 1, past agriculturally-based environmental policies have implicitly or explicitly tended to assign rights to agriculture (e.g., farmers have a "right" to use their land). Voluntary programs, cost-sharing and technical assistance, favorable tax incentives, and right-to-farm legislation correspond to such a rights allocation. In contrast, as suggested in the lower panel of Figure 1, water quality and environmental policies that are gradually shifting their focus to agriculture and other non-point sources of pollution operate on an alternative rights allocation supporting the "public's" right to clean water. Enforceable best management policies arising from the 1990 Coastal Zone Act Reauthorization Amendments, the Confined Animal Feeding Operation restrictions found in the Clean Water Act, or specific prohibitions on selected pesticides, demonstrate steps in this direction. Taxation of inputs such as those used in California, Iowa or other states, or outputs, such as the Administration's proposal to tax sugar produced in the Florida Everglades agricultural region, can similarly be viewed as allocating rights to the public by forcing farmers to "lease" access to a resource.

Such an either/or bifurcation of rights, may no longer be an appropriate or socially efficient allocation. On one side, the power of agriculture to effect policy and the failure of voluntary programs to achieve measurable environmental progress may dictate a move away from an actual or presumed rights allocation to agriculture. On the other hand, economists have long recognized that uniform regulations are suboptimal in situations where benefits and costs

Figure 1: Agricultural Environmental Property Rights Allocations and Associated Policy Options

Implied Property Rights Allocation:	Associated Public Policies
"Private Property Rights" to Farmers	Voluntary Programs Cost Sharing and Technical Assistance Right to Farm Legislation Tax Incentives
Mixed Property Rights	Thresholds: - Environmental Outputs - Production Inputs Targeting Linkages "Carrot" with Threat of "Stick" Pollution Permit Trading
"Public Rights" to Those Who Experience Contamination	Regulations, Prohibitions Taxes

have spatial variation. It is also questionable whether the public or Congress is willing, at this point in time, to implement programs against agriculture. Given these considerations, there is an impetus to develop mixed agricultural environmental property rights regimes that account for both the rights of farmers and non-farmers.

The need for a mixed property rights regime in agricultural environmental issues has, apparently, already been recognized by some policy makers at the state and local levels. As suggested in the shaded portion of Figure 1, several experiments involving innovative agricultural environmental mixed property rights policies are being pursued at non-Federal levels.

One promising mixed property rights approach is to connect the right to use a resource to observed "thresholds" of degradation or to the potential for polluting the environment. Rather

than assigning farmers an unconditional right to determine agricultural practices or establishing that households have a right to an unpolluted resource, it is possible to make resource use rights conditional on observed levels of contamination or on specified input characteristics or combinations. Such threshold, or tiered, approaches have been adopted as water protection strategies in some states that have experienced pollution from agricultural resources. In the Central Platte Natural Resources District in Nebraska, for example, a tiered strategy combines monitoring and soil types to develop a sequence of restrictions that increase in severity with the level of observed contamination in local groundwater and the vulnerability of soil to leaching. In areas with low observed levels of contamination and heavy soils, farmers have the right to adopt a wide range of management alternatives. However, when nitrate levels in local wells exceed specific thresholds (e.g. 12.5 and 20 ppm) more stringent water quality protection regulations, such as restrictions on the timing, type, and method of fertilizer application, are triggered. An alternative approach has been to link regulation to thresholds on productive inputs. Pennsylvania's adoption of an input ratio criteria in its 1993 manure management legislation, which would require farms with more than two animal units per acre to develop and implement nutrient management plans, provides an example of such an approach.

Targeting is also widely used in many states and priority watersheds to justify differential land-use controls based on specific uses or values attached to impacted resources. In this arrangement, the right to use resources is not universal, but rather depends upon competing "best" uses for individual resources. For instance, more restrictive regulations, and/or greater subsidies, might be placed in areas where potential social costs are higher because of large population exposure or use of the resource (e.g., drinking water). The New York City Watershed, which

is subject to filtration avoidance requirements established by the Safe Drinking Water Act of 1986, provides an extreme example of targeting. This watershed has been subject to greater agricultural environmental cost-sharing efforts as well as the real threat of strict regulations on agricultural practices. Alternatively, the potentially threatened resource might have some other attribute that makes it particularly worthy of protection. Local, state, and federal levels, have long used the existence of high quality or threatened fisheries, pristine waterways, or scenic vistas to identify water bodies that need additional policy intervention.

Financial linkages between farmland protection programs and environmental practices offer another mixed rights approach. Typically, farmland protection programs have provided financial incentives to landowners regardless of the potential environmental costs associated with agricultural land use, and such incentive payments are often presumed to be an agricultural "right". Challenging this standard approach, counties in Wisconsin have experimented with a Conservation Credit Initiative (CCI) program that links per-acre property tax credits to the adoption of an approved conservation plan. High levels of participation and widespread implementation of conservation methods marked an early level of success for this program, and offer potential for other states investigating agricultural property tax reform. While, on the surface, this program mirrors the conservation cross compliance sanctions initiated in the 1985 Farm Bill, the CCI is, in effect, quite different. In contrast to commodity programs which have created incentives to plant highly erodible row crops, the property tax incentive does not send conflicting financial signals.

Several other "mixed" property rights are being explored across the country as policy alternatives. Voluntary programs (the so-called "carrot") with a threat of strict regulations (the

"stick") unless a specified minimum level of participation is reached in, say, a best management program are being considered in some watersheds as an opportunities for agriculture to demonstrate that it can solve its own environmental problems without regulation. "Bad actor" regulations might be applied to farms that cause fish kills or other environmental disasters, while allowing farms without such incidents the freedom to select from a broader range of practices. Tradable pollution permits within watersheds are also widely suggested as an innovative way of allocating limited rights to farmers to use specific inputs, while protecting the right of the public to a total maximum level of inputs or environmental residuals.

Clearly there are a number of mixed property rights policy options beyond the few indicated in Figure 1. The intent here is not to provide an exhaustive discussion of all possible property right arrangements. Rather, the purpose is to emphasize that, with large, widely varying, and simultaneous benefits and costs associated with agricultural land use, such options are needed and are being developed in experiments across the country. In turn, it should be noted that this emergence of alternative property rights arrangements also heralds a need for innovation in the non-market valuation of agricultural environmental externalities. In order to best inform policy decisions, future research should develop more holistic approaches capable of accounting for and integrating the environmental benefits and costs of agriculture. With a firmer understanding of the available options and tradeoffs policy makers will be better equipped to accommodate the environmental and agricultural concerns of the general and farm populations.

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