

Can Agriculture Become an Environmental Asset?

Daniel W. Bromley

Introduction

It may be argued that the essential problem of agricultural policy in the OECD countries is one of an embarrassing abundance of commodities rather than imminent shortages. Indeed the budgetary outlays apparently necessitated by this historical novelty strain the public purse in more than one industrialized nation.¹ Moreover, usually agreeable relations among a few nations now seem in danger of being undermined by the aggressive desire to export that which the local citizenry is no longer able to eat. In the United States, despite our very best efforts, we are no longer able to eat our way through the prodigious excess of agricultural products.² Might this new circumstance—inverse Malthusianism—suggest a needed reconsideration of long-held beliefs about agriculture in the industrialized world? Might this reconsideration clear the ground for new thinking about the environmental aspects of agriculture—and about the agricultural aspects of the environment?

The story is familiar. Farmers use a bundle of environmental resources—soil and its nutrients, solar energy, water—with which they mix labour, capital, and managerial knowledge to produce their bounty. Modern agriculture, of course, brings with it an abundance of contested

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¹ In the United States, direct taxpayer support to farmers in 1996, 1997, and 1998 totalled \$22.9 billion. The top ten percent of recipients received 61 percent of the total subsidies. That is, 144,000 farmers received almost \$14 billion over this three-year period. This amounts to \$97,000 each. In Mississippi, the nation's poorest state, ten percent of the recipients collected 83 percent of all payments in that state – averaging \$217,000 per farmer over the three-year period. Ironically, the legislation creating this taxpayer generosity is called "The Freedom to Farm Act of 1996." (Williams-Derry and Cook, 2000).

² Medical experts now warn that obesity is the major public health problem in America. Given that Americans spend one of the lowest proportions of their income on food, this means we can overeat at bargain-basement prices. Try as we might, we are unable to eat enough.

land-use practices, chemicals, and residues (sediment, chemicals, salinity). Farmers will insist that they were the original environmentalists and get defensive about accusations that they abuse the environment. Environmentalists are not convinced. Environmental regulations are then proposed, to which farmers will mobilize opposition. Politicians, sensing the importance of a rural constituency, will then offer financial inducements to make compliance more palatable. Environmentalists will then complain that farmers are being bribed not to destroy nature. Is this fight necessary?

Rethinking agriculture

Imagine a new vision of agriculture. Imagine a situation in which farmers in the industrialized world are seen primarily as managers of rural landscapes and habitats, and only secondarily as producers of food and fibre. This will not be an agreeable vision for many farmers, but that should not preclude us exploring the logical entailments of this alternative.³

Under this new vision, agriculture in the industrialized nations would represent an essential means by which to accomplish three important public functions—besides producing food and fibre.⁴ First, agricultural activities would provide important *amenities* in rural areas. By amenities I mean the visual aspects that characterize many rural areas. Second, agricultural activities would provide *habitat* for a variety of wildlife. Some of this wildlife may offer recreational opportunities in the form of hunting, but the habitat dimension goes beyond these direct uses to encompass a range of animals and plants that are not directly used (and sold) but rather add to the biodiversity of the landscape. Finally, agricultural activities would provide *ecological services* that enhance the general integrity of many rural areas. Wetlands serve as nutrient filters and this constitutes part of the ecological services of agricultural lands.⁵

³ I have, with Ian Hodge, suggested a model in which farmers produce what we called “countryside and community attributes” (1990). This vision would entail more than just the environmental aspects of agriculture. It would, in addition, include aspects of economically viable rural communities.

⁴ Henceforth I will drop the reference to industrial countries and ask the reader to recall the context to which I am referring.

⁵ Note that the same physical asset, say wetlands, can represent all three environmental aspects—amenities, habitat, and ecological services.

If we admit that agricultural activity could, under certain circumstances, generate these three classes of *service flows*, the first question concerns the ideal level at which these respective services might be provided.⁶

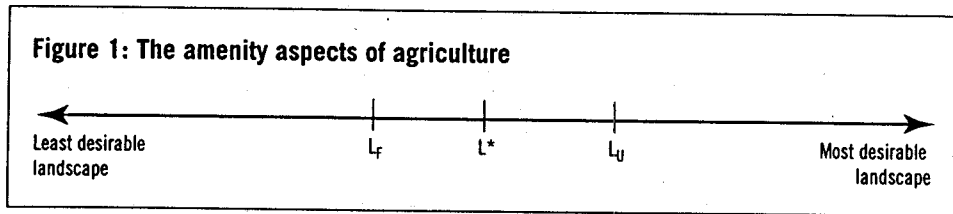
Amenity attributes

Amenity attributes concern visual aspects of the rural countryside that make it pleasing (or unpleasant) to the visual senses. The pleasing rural landscape of New England, Normandy, the English downs, and the Schwarzwald capture what I mean by amenity attributes. These rural landscapes have been created by agriculture and this rural character is important in its own right, apart from the production of agricultural products.⁷ The challenge here, as with the other environmental aspects of agriculture, arises because markets do not exist for the amenity aspects of agriculture and farmers may not therefore be sufficiently induced to undertake managerial decisions in the interest of the adequate provision of these amenities. Controversy follows when farmers, driven by the economic pressures of—ironically, superfluous—agricultural production, may destroy certain amenity attributes that the public has come to value. In this setting, the public is disinclined to grant the argument that as the owner of the land the farmer is free to do as he/she pleases. Indeed, the conflict is precisely one of the permissible latitude in land uses that run with the varying presumptions of ownership. I will presently comment on this aspect of the problem.

Consider changes in the agricultural landscape that alter the collective perception of its amenity values. If we imagine a continuum as in Figure 1, we can define the current situation as L^* . Here there might be some dispute about the direction of change from the status quo (L^*). If public policy pushes farmers to provide a landscape that is desired by urban residents then they (farmers) might believe they are being made to *provide* additional amenity benefits and should be compensated accordingly. On the other hand, if farmers seek to provide a less desirable landscape—to reduce the amenity aspects of the countryside—then they might be

⁶ I have greatly benefited from many conversations on this topic with Dr. Martin Scheele of the Commission of the European Union.

⁷ Indeed the controversy over removing hedgerows in England and France reminds us just how attached we can become to constructed landscapes – some of them created not thousands of years ago (and hence old enough to be thought “historic”) but only within the past several centuries.



accused of *causing harm*. Under this situation, environmental advocates might insist that farmers should be charged accordingly.

We see here the problem of the arbitrary nature of the *status quo ante*. Notice that L^* is simply the momentary assessment of the amenity attributes of the rural landscape. This level of amenities becomes the norm against which a change in policy would be evaluated. Assume that urban interests advocate a different landscape in rural areas. We might think of this as L_U . Farmers, in reaction to this might insist that L_F is really the appropriate level of rural amenities and they are already providing L^* . In this setting, the distance L_F-L_U becomes the *bargaining space* within which this particular policy dispute will be pursued. Urban politicians will advocate L_U while rural politicians will be likely to advocate L_F . We might regard these two points at the extremes of the bargaining space as the *reference points* for the two positions; it is to these two points that the political process will refer as it seeks to resolve its disagreements.

The difficulty in the policy debate over amenity values from agriculture is that there is no “right” or “correct” level of rural amenity. There are landscapes that are more appealing than others, but there are few precise rules that indicate the correct landscape.⁸ Hence the amenity implications of agriculture are probably susceptible to more serious policy disputes than are the implications of agriculture for habitat and ecological processes.

Habitat attributes

The habitat attributes of agriculture are reflected in the maintenance of plants and animals that are *not* part of the agricultural enterprise. As with the amenity attributes of the agricultural landscape, this aspect tends to focus on the land and water resources directly associated with the land in

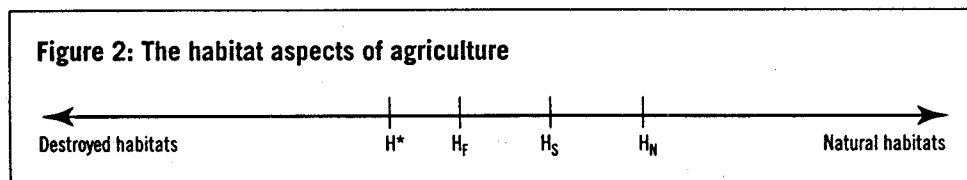
⁸ There is now a voluminous literature in environmental economics that seeks to value nature by means of ascertaining how much people would be willing to pay to achieve certain levels of nature (or nature's services). For a comment on this practice see Vatn and Bromley (1994).

farms. In many areas hedgerows and field borders provide for birds and small mammals, and for native plant species.

Unlike the amenity attributes, the habitat implications of agriculture entail more certitude regarding the reference points for policy. Waterfowl require certain minimum areas for nesting. Wildlife requires certain feeding conditions and cover. Fish require water of a certain temperature and purity. Wildflowers and songbirds also have certain ecological circumstances necessary for their survival. When agricultural practices are undertaken in a manner to ensure that these minimum circumstances are met, then some would argue that farmers are *providing* habitat benefits. On the other hand, some might argue that in the absence of agriculture there would be even more of these circumstances and hence the very presence of agriculture has diminished the habitat component of rural areas. As with the amenity values of agricultural land use, there are no markets for the habitat values that farmers may provide and hence we might suspect that they are under-provided relative to what might be made available if there were financial incentives to which farmers might respond.

Consider the matter of wetlands. We might imagine a situation as depicted in Figure 2 in which H^* represents the experts' views regarding an absolute minimum level of wetlands in a particular agricultural region, while H_S represents the *status quo ante* level of wetlands. To the right of H^* we see the two reference points— H_F for the farming community and H_N for the naturalists who advocate far more wetlands than currently exist (H_S). While farmers do not necessarily seek to push total wetland area down to the absolute minimum (H^*), their preferences probably suggest less wetland area than at present, while naturalists favour larger areas devoted to wetlands.

As with amenities, the policy response to this situation will differ. Farmers will fail to understand why they should be prevented from moving from H_S toward H_F . Indeed, we sometimes see pressures for financial compensation of farmers for the "lost" income from holding them to H_S .

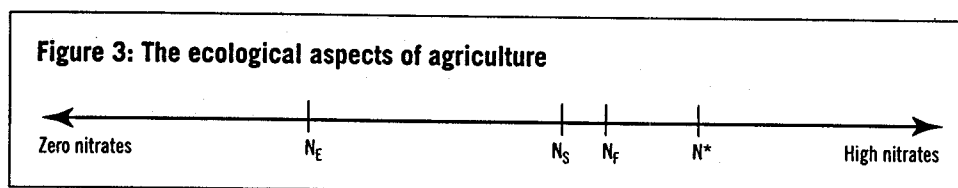


rather than allowing them to modify natural habitats to H_F . And of course the naturalists seek to have wetlands restored so that movement in the direction of H_N is achieved. Farmers will suggest that by being restrained to the *status quo ante* they are being made to *provide* habitat benefits for which compensation should be forthcoming. Naturalists will insist that agriculture has, in fact, destroyed the vast majority of wetlands that existed prior to the spread of agriculture and that constraint—not compensation—is the proper public response.

Ecological attributes

The ecological attributes are those aspects of agriculture that affect, positively or negatively, ecological functions beyond the boundary of the farm. Examples include the contamination of downstream rivers and lakes by agricultural chemicals, and the filling of downstream waterways by excessive soil erosion. On the other hand, farmers can undertake land-use practices that restore and enhance ecological processes. A wetland can act as a filter and a sink for certain agricultural chemicals, thereby enhancing downstream ecological processes. Improved soil management practices and contouring reduce erosion and thus enhance downstream water quality.

Assume that nitrate contamination of groundwater is the problem to be addressed. Let N^* represent the upper threshold of nitrate concentrations beyond which medical experts warn that widespread and serious health effects will be prevalent in the general population.⁹ Assume that the *status quo ante* level of nitrate concentration is N_S while farmers believe that nitrates in groundwater will not become a problem until the concentration level reaches N_F . Ecologists, on the other hand, might be expected to advocate a concentration level much closer to N_E .



⁹ Danger to the general population comes at a higher nitrate concentration level than for infants and pregnant women, so N^* represents a concentration at which certain segments of the population would need to take averting actions.

We see once again that perceptions of what is correct will differ markedly across the various interest groups. Farmers can be expected to advocate a nitrate level that is somewhat higher than the *status quo ante*, but would certainly resist efforts to reduce it below the current level (N_S). They might not feel comfortable advocating moving too close to N^* , but they would probably stick hard to N_S if not necessarily N_F .

Getting there from here

If we are to reconsider the way we think of agriculture and the environment, the above discussion offers a possible—though incomplete—start. Two more dimensions require consideration. The first entails considerations of property rights in land, while the second entails the incentive structures necessary to alter the current policy climate. The challenge before us is to find better ways to promote the use and management of the rural environment—all of which is held under private ownership—in a way that is both efficient and equitable.

Contested property rights

As we saw above, there will be questions about whether farmers are *providing* (or enhancing) environmental attributes. Or, is the question properly framed in terms of agricultural activities *preventing* harm to valuable environmental assets? We have two *status quo antes* under consideration—one might be thought of as the political *status quo ante*, while the other is an environmental *status quo ante*. On the *political* side, agricultural interests will argue that they are *providing* public benefits. There is a plausible case for this argument when we think of the amenity implications of agriculture. After all, it is the manicured countryside that many urban residents now associate with rural areas. Indeed, many urban residents may hold the well-maintained agricultural landscape in higher esteem than they would a natural forest. If so, then agriculture may provide—interestingly—net amenity benefits in comparison with a more “natural”—or rough—landscape. But if fences and hedgerows are ripped out to permit ever-larger machinery, and if quaint barns and other buildings are removed, then agricultural practices are seen as diminishing the amenity aspects of rural areas.

The same may well hold for habitat implications of agriculture. If the agricultural landscape is geared toward some provision of wildlife habitat,

then agriculture may be a net provider of habitat benefits. We know that a varied landscape is ideal for a range of wildlife, and under the proper circumstances agriculture provides precisely that varied habitat. But of course when farmers undertake to drain wetlands, or to clear forests to expand the area in crops, or to homogenize the landscape in other ways (through monoculture), the habitat implications of agriculture are negative.

There would seem to be less credibility to an argument that modern agriculture is "ecologically friendly". Of course there are agricultural regimes in which an effort is made to use nature as an ally rather than as an enemy. Farmers who practice sustainable agriculture tend to see themselves in this light. For the most part however, modern agriculture—with its heavy reliance on chemical inputs—cannot lay claim to that status.

We see that the idea of a *political status quo ante* and an *environmental status quo ante* is at the heart of much of the struggle over the environmental implications of agriculture. In some instances the difference may be quite obvious. If pure groundwater is contaminated by heavy applications of agricultural chemicals then there seems little basis for suggesting that farmers should be compensated for their inability in the future to carry on such practices—their protests to the contrary notwithstanding. But of course the political power of farmers may be such that they are able to acquire compensation in order to agree to cease these practices. In this case we would say that they have managed to use the political system to define a new *status quo ante*—any change from which must be compensated.

But things are not always so easy. We cannot logically insist that the environmental *status quo ante* is always properly regarded as that prevailing prior to any human action whatsoever. This suggests that with amenity and habitat aspects of the rural countryside, a more nuanced approach is necessary. Recall that in Figure 3 the conflict was between so-called "experts" and farmers about the acceptable level of nitrates in groundwater. However, there was certainly no dispute that nitrate concentrations prior to "modern" agriculture were very low indeed. The issue with nitrates is simply one of acceptable standards.

Notice, however, in Figures 1 and 2 that the issue is not one of acceptable levels—a threshold—but rather of more general standards of landscape appearance and habitat attributes. Of course there might be

disputes about these things as shown in Figures 1 and 2. But the concern is not to compare the current situation with some pre-human condition. Rather, the concern is to determine in the political arena what level of amenities and natural habitat is regarded as the acceptable reference level against which deviations are to be penalized or rewarded. We see an environmental *status quo ante* and a political *status quo ante* at work here, but in a more subtle way than with nitrate contamination.

But the ultimate test is found in what we regard as the *environmental status quo ante*. Whether or not the general conclusions intimated above really hold up to scrutiny will depend on whether or not the perceived "natural state of affairs" has been improved upon or diminished. So we see that there can be fundamental disagreements about whether particular actions constitute the provision of benefits to the public, whether the benefits would be forthcoming regardless of the efforts of farmers, whether agriculture represents a net decrease in the three environmental implications (amenities, habitat, and ecological processes), or whether the actions of farmers mean that important damages are precluded. And these disagreements lie at the heart of many environmental disputes focused on agriculture.

We see that many of the disagreements centered on agriculture and the environment arise from the different perceptions about property rights inherent in land. Farmers will argue that since they *own* the land on which they farm, they are free to treat it as they wish. If a wetland stands in the way of greater agricultural production, then the farmer is likely inclined to believe that he/she has a "right" to pursue that production. Farmers tend to regard wetlands as impediments to greater agricultural production, as forested areas were impediments in earlier times. In the farmer's mind, wetlands inhibit higher production and income and so are seen as a liability.

Notice that this matter is not confined only to wetlands. As suggested above, trees can also be seen as impediments to agricultural production. Indeed, agricultural history in the temperate zone has been one of constant struggle against the forest. A balance seems to have been struck between the proportion of the landscape that shall remain forested, and the proportion that shall come under the plough. And one aspect of that balance is the general appearance of the rural countryside that is now found so compelling.

But the central issue here is that those who care about rural amenities, rural habitat for plants and wildlife, and general ecological processes, will argue that the mere fact of land ownership does not thereby bestow the right to destroy "nature" (as they have come to define it). These individuals and groups would point to a range of land uses that are no longer permitted, even though at one time—under different socioeconomic conditions—those particular uses were considered acceptable. It is precisely these different perceptions that make agricultural land-use policy so contentious and so important. The issue is certainly not new. We see a hint of this in the following quote from the historian R. H. Tawney:

Property was to be an aid to creative work, not an alternative to it...The law of the village bound the peasant to use his land, not as he himself might find most profitable, but to grow the corn the village needed....Property reposed, in short, not merely upon convenience, or the appetite for gain, but on a moral principle. It was protected not only for the sake of those who owned, but for the sake of those who worked and of those for whom their work provided. It was protected, because, without security for property, wealth could not be produced or the business of society carried on [Tawney, 1948, pp. 59-60].

Tawney sees property rights as a social construction. If it is true that "property rights" are *discovered* in the course of mediating conflicts in the legislature and the courts—and I have advanced this position elsewhere—then "property" is not protected because it is, a priori, a *right*. Rather, that which manages to gain protection through the courts becomes, by virtue of that protection, a property right (Bromley, 1991, 1993, 1997; Christman, 1994). The implications of this for the new vision of agriculture and the environment are profound.

Getting the incentives right

A major problem with agricultural policy in the industrialized world is that governments must contend with prodigious surpluses, and must also spend public funds to prevent farmers from creating ever-greater environmental harms. If the agricultural enterprise were thought of as a land-management activity, perhaps this problem might be approached from a fresh perspective. The goal of agricultural policy would be to assure a particular constellation of environmental attributes in rural areas—including viable communities—and also to assist with the production of food and fibre. In the process it might be expected that budgetary outlays

would shrink. Once local parameters on acceptable land use practices were specified—a process that need not differ materially from that which has long existed in urban areas—the appropriate policy instruments could then be chosen accordingly. Farmers would then remain free to choose enterprises and methods of production so long as the final result does not violate the plan. Thus it would be the relatively local collective interest that specifies the level of amenity, habitat, and ecological services that will result from agriculture. If a particular farmer should wish to undertake a set of agricultural practices that would detract from the defined level of environmental attributes the farmer would need to pay for the right to deviate from the plan.¹⁰ Notice that the burden of proof—and the direction of payments—have now shifted. There would no longer be the need for side-payments going to farmers to induce them to avoid damaging the environment. If farmers wish to deviate from the accepted plan in order to achieve a greater income, these new practices would need to be approved. Once agreed upon, *environmental impact fees* would flow from farmers to local entities, or to regional or national coffers.

The changes discussed here imply an alteration in the implicit entitlements in the policy arena. Under the new system the nature and scope of agricultural production would, of necessity, be more consistent with a desired constellation of environmental attributes in particular rural areas. The implicit right to pollute rural streams, to drain and fill wetlands, to destroy wildlife habitat, to allow accelerated soil erosion—and to demand public monies to refrain from these activities—would no longer exist. The prevailing side payments that now induce farmers to modify their actions would disappear. Rather, agricultural production would be governed by careful consideration of requests for certain environmental changes that might threaten important environmental attributes.¹¹

Governments will still have an interest in protecting their citizens from swings in food and fibre supplies and prices. It will also be important to insulate farmers from the more serious income swings that can occur in

¹⁰ Again, the comparison with urban development—in which exactions and impact fees are the norm—is obvious.

¹¹ We should not imagine that this aspect is either novel or uncommon. Local governmental jurisdictions in the United States, imagined to be a place where *laissez faire* reigns, are quite willing to refuse to allow large agricultural operations that threaten environmental quality (manure smell and runoff, unsightly “industrial” appearance in a region of family farms, etc.). In Europe this control of agricultural practices is firmly entrenched.

agriculture. It will, in other words, be necessary to ensure that agriculture remains an attractive economic endeavor. After all, if the goal now is to provide managerial services to rural environments it is essential to have farmers engaged in those activities. Payments to farmers, if necessary at all, could thus be in the form of income supplements rather than payments tied to particular commodities grown or—in some cases—not grown.

Implications

The agricultural landscape has become an environmental asset of great importance to rural and urban residents alike. With this new-found appreciation of the rural countryside comes the obligation to make sure that this asset is wisely used and well maintained by those engaged in agricultural pursuits [Bromley and Hodge, 1990]. The presumptions of private property are at the core of this new vision. Where the larger “public interest” can be shown to be consistent with the protection and enhancement of environmental attributes in rural areas, then the presumptions that have traditionally run with the ownership of private land are subject to change. It is not surprising that various legislatures and courts have understood the necessity to adjust the presumptions of private property.¹² Where that recognition is not yet well formed and articulated, we can expect that the vision articulated here may be somewhat premature. But for most of Europe, and indeed in parts of the United States, this is not a departure from current practices.

My presumption is that a large number of people are frustrated by the current state of play in agriculture-environment interactions. The lack of a creative solution to this expensive and contentious realm has eluded us because we are stuck with a mental model that still regards agriculture as primarily concerned with the production of food and fibre. Once agriculture is liberated from this historic trap and reconsidered as the realm of landscape and habitat management, clarity replaces conflict. With the advent of inverse Malthusianism in the industrialized world, there is now no coherent reason to resist the necessary transition. It is not, to be sure, “post-modern”. Rather, we might think of it as post-Malthusian.

¹² For a discussion of this matter in the U.S. see Bromley (1993, 1997).

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