



Putting Prices on Mother Nature

by James E. Wilen

Recently, a group of economists took a stab at estimating the economic value of the services provided by the entire suite of the biosphere's natural ecosystems. While the authors were roundly criticized by some for the audacity of even attempting such a task (and by others for the methods actually used), their estimate of 33 trillion dollars annually provides at least an interesting benchmark with which to think about the earth's natural assets. The larger point made by the study was that the earth's natural assets, like man-made commercial assets, produce flows of services that not only support and enhance life, but that are economically valuable to humans. Examples of ecosystem services include: nutrient recycling, water and air filtration services, pollution assimilation, gene banks, aesthetic services, recreational services, wildlife habitat, etc.

Ecosystem services are what economists often call non-market services, in the sense that they are

mainly provided, without charge, by the earth's many and varied ecological systems. The fact that they often carry no explicit price does not mean that they do not have value to humans, of course, and as the 33 trillion dollar estimate suggest, they probably have enormous value. But why would we want to go to the trouble of measuring the economic value of such services? One reason is simply to know the value and to put it in perspective compared with other monetary measures that value the services from man-made assets, such as Gross National Product (GNP). For example, the 33 trillion dollars is equivalent to 1.8 times the entire world's GNP. The other reason is because nonmarket goods and services from natural ecosystems tend to get misused by humans. And for resources that are misused (particularly overused), it may be important to develop "proxy" market values so that we, at minimum, know the value of what

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we are losing through misuse. We may also want proxy values so that policy makers can make decisions about these resources that accurately reflect the values of ecosystem services when they conflict or otherwise interact with conventional market values. For example, while everyone knows that forests provide wood products, they also remove carbon dioxide, produce oxygen, stabilize climate, store and purify water, and provide habitat for plant and animals. These non-timber services clearly have value and some of them are diminished when forests are removed. An important public policy question is how large the non-market ecosystem service values are compared with traditional monetary timber values. In a similar vein, agriculture provides many benefits such as green space, wildlife habitat, and aesthetic vistas to urban, suburban and rural residents. These kinds of services clearly have value, but they are generally provided without compensation by farmers as a by-product of ordinary farming operations.

How and why do these kinds of resources get overused? The popular literature often attributes environmental overuse problems to “capitalism”, or “greed”, or a lack of “ethic” about the environment. But in a paradoxical way, it may be the absence of normal market forces that is the source of the problem. As it turns out, whether a natural resource is owned as private property is one important determinant of the degree to which it will be overused. Private property is generally an important stimulus to conservation and wise use of natural resources. A farmer who owns his own land does not generally degrade the productive capacity of his own soil, since by doing so he reduces the value of his land. On the other hand, the same farmer may contribute (marginally) to overdrawing an aquifer beneath his land, precisely because he doesn’t “own” the aquifer. With a farmer’s soil, the consequences of his own decisions are internalized in the sense that he must bear all (or most) of the costs of his own overuse decisions. With the aquifer, on the other hand, an individual farmer cannot be expected to account for the fact that as he makes a decision that draws the water table down for himself, he raises the pumping costs to all others (if even by a small amount). The same farmer may not pay enough attention to the costs imposed on downstream users of a watercourse bordering his land when it is used to carry away runoff containing pesticides,

herbicides, and soil contaminants, because again, he has no “ownership” interests in the assimilative capacity of the river as a natural asset. The accumulation of these “spillover effects” or “externalities” arising from uncoordinated decisions impinging on a shared resource is often referred to as the “tragedy of the commons”.

Three broad approaches have emerged about how to reduce the spillovers that arise out of uncoordinated use of shared or common resources. The first and most familiar simply involves setting limits on aggregate use for the whole system and then regulating individual users to ensure that the limits are not exceeded. For example, automobile air pollution regulations begin with some absolute standards for air quality in the worst case cities. Then, regulators calculate just how stringent the controls must be on new automobiles to reach those standards in the worst case cities. In a similar fashion, the Bureau of Land Management determines how much grazing is acceptable while maintaining long run land quality, and then regulates the number of “animal units” that will protect against overuse. Recreational hunting and fishing and commercial fisheries are managed similarly; biologists determine an allowable harvest, and then bag limits, closed seasons, and closed areas are used to achieve the allowable catch. Until recently, these kinds of centralized and “command and control” regulations were about the only kind used and envisioned by resource managers.

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Some Facts About Farmland Values

by

Steven C. Blank

Some people pay casual attention to farm real estate values and overestimate the financial performance of the production agriculture sector. It is easy to misinterpret recent increases in farm real estate values as evidence of strong profitability in the production agriculture sector because “in rural areas, agricultural land values are primarily determined by the income earning potential of the land, as measured by expected returns from crops and livestock” (USDA 2000a p. 30). However, a more detailed assessment of the facts related to farmland values gives a much different outlook.

The fact that average farmland values in the United States have risen for a decade masks the fact that long-run performance of farmland values tells a different story. Also, recent changes in the markets for farm real estate and the implications of those changes are often overlooked. Therefore, to provide a long-run perspective, this article presents farmland value data for the past two decades and a summary of the USDA’s explanation for the recent increases.

To begin, Table 1 presents farm real estate average values per acre for the period of 1980 to 1998, as reported by the USDA. Data are presented for the entire United States, plus separate values for the three states with the highest levels of agricultural revenue: California, Texas and Iowa. The value levels are quite different in the four columns, but in each case the effects of the “farm crisis” of the 1980s is apparent. Values peak in some year during the early/mid-1980s, fall for a few years and then begin a recovery. Farm real estate values had increased steadily prior to the “farm crisis,” but the changes in commodity markets that led to the crisis have fundamentally changed the economics of land markets in the United States. Variation between the aggregate national values and the values in each of the states signals that a detailed assessment is necessary.

For the U.S., the peak of \$823/acre occurred in 1982, the bottom was in 1987, and the recovery was completed in 1995 when values rose above the level of the earlier peak. The recovery was even slower if only

land values are considered instead of real estate values. “Real estate” includes the value of land and buildings. For land, the peak of \$715/acre was reached in 1982 and by 1995 (the last year for which data were reported by the USDA) the value had risen only to \$644. Thus, land and its income-earning potential had not fully recovered by the time that real estate values did, indicating that real estate values are inflated by farmers’ continued investments in buildings and other improvements to land.

Table 1. Farm Real Estate Average Values per Acre, 1980 - 1998

Year	Value of Land and Buildings (\$/acre)			
	United States	California	Texas	Iowa
1980	737	1,424	436	1,840
1981	819	1,732	468	1,999
1982	823	1,900	539	1,889
1983	788	1,918	544	1,684
1984	801	1,981	612	1,518
1985	713	1,841	694	1,091
1986	640	1,730	594	873
1987	599	1,554	546	786
1988	632	1,575	544	947
1989	668	1,742	521	1,095
1990	683	1,884	507	1,090
1991	703	2,077	498	1,139
1992	713	2,157	488	1,153
1993	736	2,213	499	1,212
1994	798	2,210	515	1,280
1995	844	2,220	525	1,350
1996	887	2,400	540	1,450
1997	926	2,500	554	1,600
1998	974	2,610	593	1,700

Sources: “Farm Real Estate Historical Series Data, 1950-92”, USDA Statistical Bulletin No. 855 and “Agricultural Land Values: Final Estimates 1994-98”, USDA NASS Statistical Bulletin, No. 957.

For the three leading agricultural states, very different pictures emerge, indicating that agriculture has not recovered from the farm crisis. California farm real estate peaked later and recovered sooner (in 1984 and 1991, respectively) than did the national average values. However, weakness in agricultural profitability was apparent when California land values fell from their 1993 high in both 1994 and 1995, despite increases in farm real estate values during those years. In Texas and Iowa, farm real estate values and land values are more correlated, but neither state has fully recovered. Texas farm real estate values peaked at \$694 in 1985 and after their 1992 bottom had rebounded only to \$593 by 1998. In Iowa, farm real estate values peaked at \$1,999 in 1981, hit bottom in 1987 and increased only to \$1,700 by 1998. Thus, in 1998 both Texas and Iowa farm real estate was valued at only 85% of its earlier peak value. Finally, these values do not reflect the effects of inflation. Using the Consumer Price Index for 1980 to convert the real estate values for that “pre-crisis” year to real terms (in 1998 dollars) gives \$1,458 for the U.S., \$2,817 for California, \$862 for Texas, and \$3,640 for Iowa. Comparing the real 1980 value to the 1998 value shows that U.S. farm real estate values in 1998 were only 67% of their 1980 value. For California, Texas and Iowa, a similar comparison results in 93%, 69% and 47%, respectively, showing that California has had the strongest recovery of the three states and Iowa the weakest.

Average gross cash rents to cropland reported by the USDA show the same pattern as seen in real estate values. In California, cash rents per acre peaked in 1984, recovered by 1993, but in 1995 they fell again to about their 1984 level. In Texas and Iowa, gross cash rents peaked in 1981 and 1982, respectively, and neither has fully recovered.

If agricultural income has not been strong, as indicated by the falling real cash rents observed over the last two decades, then what has been pushing up farmland values in recent years? One answer was provided by the USDA (2000a p. 30):

“Although average agricultural land values nationally are determined primarily by the income earning potential of the land, nonagricultural factors appear to be playing an important role in many local areas. To some extent, the buoying effect of these nonagricultural factors on agricultural land values could be partially offsetting the effect of lower returns from agricultural production.”

What the USDA report called “urban influence” affects only about 17% of U.S. farm acreage (and almost all of California’s harvested acreage), but has a significant

impact on farmland values. They estimated that during 1994-96 the value of farmland that was not urban-influenced was \$640 per acre, compared to \$1,880 for urban-influenced farmland. Thus, they concluded that 66% of urban-influenced farmland market value was due to nonagricultural factors.

“The market value for undeveloped farmland in these areas often begins to rise above its value based on agricultural returns alone, reflecting anticipation of eventual non-agricultural uses.”

This explains why New Jersey had the nation’s highest average farm real estate value during 1998 at \$7,000 per acre.

These results offer two factors as partial explanations for the differences in farmland values observed for the three leading agricultural states. First is the potential profitability of the crops that can be grown on a parcel of land. Second is the potential for nonagricultural uses of a parcel. For California, the prospects for both factors are better than the prospects for Texas and Iowa, thus farmland values are higher here and have made a stronger recovery relative to values observed before the farm crisis of the 1980s.

What are the national prospects? As of February 2000, the USDA (p. 31) reported that “farmland values at the national level are forecast to be flat for 1999 and 2000” due to declines in the profitability of many crop markets. This is despite a record \$22.7 billion in direct government payments to farmers in 1999 and over \$15 billion approved thus far in 2000 (USDA 2000b). Clearly, agriculture since the farm crisis of the 1980s is different than the industry of earlier decades.

For more information

U.S. Department of Agriculture, “Accumulated Farm Real Estate Value Will Help Farmers and Their Lenders Through Period of Declining Cash Receipts,” **Agricultural Income and Finance: Situation and Outlook**, Economic Research Service AIS-74, February 2000a, pp. 30-3.

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Get Ready for More Commodity Promotion Litigation

by

John M. Crespi

Throughout the 1990s, generic advertising programs were enmeshed in litigation over their constitutionality. The key arguments evolved around the First Amendment rights of industry participants who were compelled to fund generic advertising programs. In 1997, the U.S. Supreme Court ruled in *Glickman v. Wileman* that programs for California nectarines, peaches and plums did not infringe upon the First-Amendment rights of participants. Although the decision was slim (5-4), most observers believed that the ruling would allow celebrities to continue wearing milk mustaches with impunity. As expected, cases that had been pending in lieu of the Court's decision in *Wileman* were quickly dispensed. Thus, it was quite a shock when in November of 1999, the 6th Circuit Court of Appeals ruled that the Mushroom Promotion Program was unconstitutional. The Department of Justice has until June 21st to decide whether or not to ask the Supreme Court to take up the issue of generic advertising once again. Until the Supreme Court rules on this issue, expect more litigation, especially in regards to so-called "stand-alone" promotion programs that were created after the original depression-era legislation that had established the marketing orders.

Recall how the generic advertising litigation came about in the first place. In 1937, the Agricultural Marketing and Agreement Act (AMAA) was established, providing the statutory authorization for marketing orders. Not without controversy itself, the AMAA survived an important initial challenge of its constitutionality before the Supreme Court in *United States v. Rock Royal CO-OP* in 1939. In 1954, Congress amended the AMAA to authorize "marketing development projects" that included provisions for generic promotion and advertising to be funded through mandatory assessments on producers in the marketing order (provided, of course, that the program passes the necessary grower referendum; for more information on marketing orders see the Agricultural Marketing Service's Web site at www.ams.usda.gov). Popular media advertisements like, "Got Milk?", the California dancing raisins and "California Real Cheese" are examples of such industry-funded, generic advertisements. In the late 1980s, producers began to challenge these programs on the grounds that they violated their rights to be free of compelled speech.

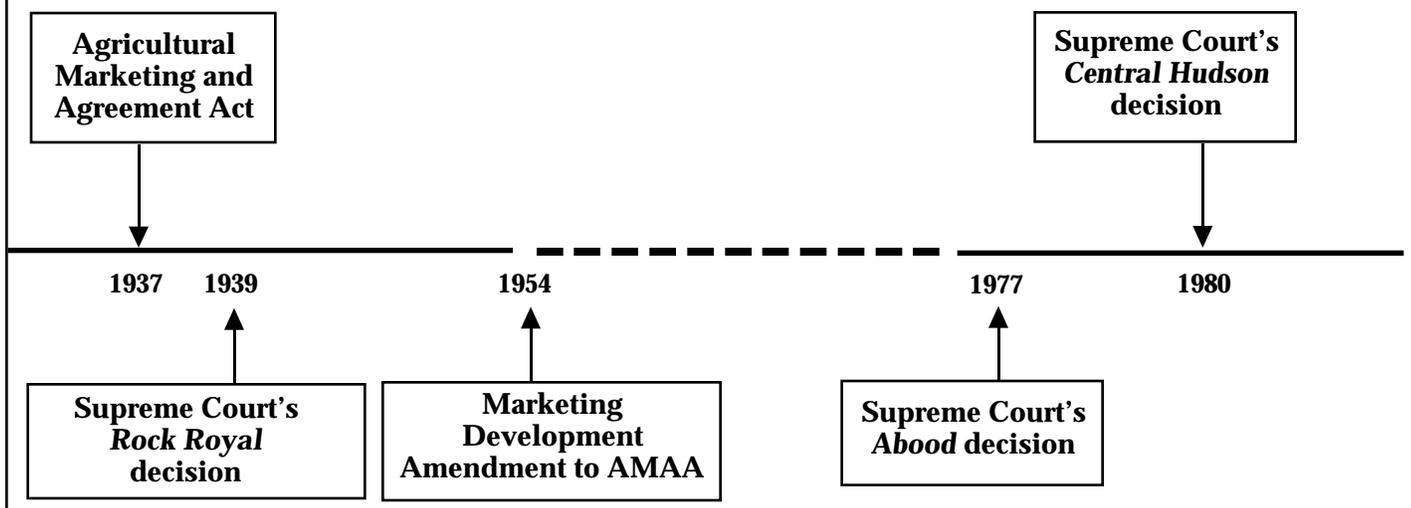
One may wonder why a 1954 Act of Congress seemed to go unchallenged until the late 1980s. The simple answer is that the marketing-order litigation could not have started any sooner, as it was a natural extension of two Supreme Court rulings that were not handed down until 1977 and 1980.

In 1977, the Supreme Court issued a ruling in *Abood v. Detroit Board of Education* that made certain union assessments compulsory, but limited how the unions could use that money. Simply, an *Abood* test requires that the funds collected be relevant to the goals of the government interest and may not be used to fund ideological activities. In 1980, the Supreme Court ruled in *Central Hudson Gas & Electric v. Public Service Commission of New York* that compelled commercial speech had to meet three requirements in order to pass constitutional muster. First, the program must involve a substantial government interest. Second, the regulation must directly advance that interest. And, third, the government's program must be narrowly tailored to minimize adverse impacts on First Amendment rights.

[W]hat we are reviewing is a species of economic regulation that should enjoy the same strong presumption of validity that we accord to other policy judgements made by Congress. The mere fact that one or more producers "do not wish to foster" generic advertising of their product is not sufficient reason for overriding the judgement of the majority of the market participants, bureaucrats, and legislators who have concluded that such programs are beneficial.

Justice Stevens
Glickman v. Wileman
U.S. Supreme Court, 1997

Figure 1. Important Dates in Marketing Order Litigation



Following *Abood* and *Central Hudson*, the first test of generic promotion programs came in 1988 with the 3rd Circuit's hearing of *United States v. Frame*. Robert Frame, a Pennsylvania cattle rancher and auctioneer, refused to pay assessments mandated under a 1985 amendment to the Beef Promotion and Research Act of 1976. Frame argued that his First-Amendment rights had been violated because the beef promotion program compelled him to associate with his competitors and pay for advertising when he would prefer to remain silent. Citing *Abood*, the 3rd Circuit Court ruled that, indeed, Frame's rights were implicated, but that the government had demonstrated that the Beef Act served compelling state interests (to aid a struggling beef industry), and the promotion was ideologically neutral, and, therefore, constitutional.

Around the same time, some California almond handlers raised a similar challenge against the almond marketing order (*Cal-Almond v. USDA*). When the case finally made its way to the 9th Circuit Court of Appeals in 1993, rather than using *Abood*, the 9th Circuit applied the three standards of *Central Hudson*. The 9th Circuit agreed that increasing the return to the almond industry by stimulating demand was a substantial government interest. Nevertheless, the Court found no evidence that the Almond Board's advertising had any effect on almond demand, and, therefore, could not be said to further the goals of the regulation. Moreover, the Court cited inconsistencies in the order's credit-back provisions, that were "more extensive than necessary to serve the interest of increasing almond sales." Having failed on prongs two and three, the generic advertising and promotion program of the almond marketing order was judged unconstitutional.

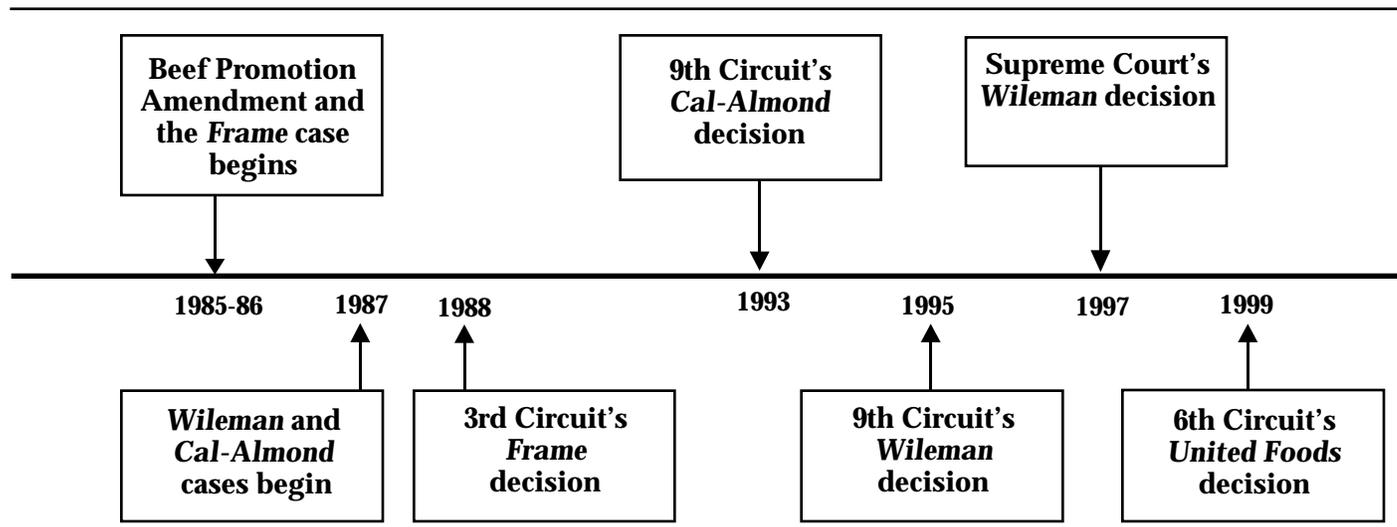
Following the almond case, dozens of commodity promotion cases arose. Because the 3rd and 9th Circuit Courts had given decidedly different opinions in very similar cases, it was inevitable the Supreme Court would become involved. That day came in December 1996 when the Supreme Court heard arguments in *Glickman v. Wileman*. The case had been appealed from the 9th Circuit, which had found that the promotion programs for California nectarines, peaches, plums, like the almond program, failed the second and third prongs of *Central Hudson*.

In the *Wileman* case, a five-member majority ruled that the correct standard to be used was that of *Abood*, while the dissenting opinion favored that of *Central Hudson*. Writing for the Court, Justice Stevens time and time again stressed the statutory context within which the generic promotion programs had arisen and that the generic campaigns had to be viewed in light of the regulatory scheme that Congress had put forward. Simply, as long as the regulatory means furthered the programs' goals and did not compel ideological speech, that was all that was necessary to satisfy the programs' constitutionality (see the text box on page 5 for Justice Stevens' own words).

In the two years following the 1997 *Wileman* decision, cases that had been pending around the country were quickly decided in favor of the promotion programs. The *Cal-Almond* decision, for example, was reversed following *Wileman*. That is why it came as a shock when in November of 1999, the 6th Circuit ruled that the stand-alone mushroom promotion program was unconstitutional.

A Tennessee food processor challenged the 1990 Mushroom Act arguing that the regulatory

1937 to 1999



environment of the mushroom industry differed enough from that of the California tree-fruit industry so as to make the *Wileman* decision inapplicable (*United Foods v. USDA*). The 6th Circuit, deciding that the mushroom industry was much less regulated than the tree-fruit industries, ruled that “compelled commercial speech is not a price the members must pay . . . to further their self interest.” Although the 6th Circuit’s ruling is limited to programs in its jurisdiction, it threatens perhaps an even greater litigation headache.

What is imperative to see in the 6th Circuit’s ruling is that the conflict that has now arisen is different from the previous conflict that the Supreme Court settled with the 1997 *Wileman* ruling. In the previous conflict involving the *Frame* and *Wileman* decisions, Courts were disagreeing over the test to apply (*Aboud* or *Central Hudson*), not the degree of regulatory differentiation among programs. If other courts follow the 6th Circuit’s interpretation of *Wileman*, the constitutionality of a promotion program will be judged upon the *extent* of regulation in an industry, no small task given the complexities of government intervention in agriculture. Any commodity board member who believes the 6th Circuit’s decision is only a minor detraction from the “omnipotence” of the *Wileman* ruling may be unduly optimistic. At least twenty commissions and councils established separately from the AMAA exist in California alone, with regulatory provisions only for research and/or promotion. When the 9th Circuit, whose skepticism toward generic advertising brought about the *Wileman* case, reversed itself in *Cal-Almond* (September 21, 1999), Judge O’Scannlan (quoting Stevens) wrote, “it would appear that the almond handlers are ‘part of a broader

collective enterprise in which their freedom to act independently is already constrained by the regulatory scheme.” Such a premise for ruling against the almond handlers sounds a peculiar note of similarity to the 6th’s ruling in favor of *United Foods*. In other words, the 6th Circuit’s viewpoint may not be contrary to the 9th Circuit’s because the mushroom program, unlike the almond program, is *not* part of a broader regulatory scheme.

The 6th Circuit’s ruling may very well stand for some time, as the Supreme Court may not wish to take on promotion programs so soon after their last decision, and the Department of Justice may wait for a clearer conflict among the Circuits to arise. In either case, expect growers and handlers around the country, especially those in stand-alone programs, to test judges’ interpretations of the regulatory necessities of *Wileman*. Is commodity A’s promotion program constitutional because A is more regulated than commodity B? Nectarines might be more regulated than mushrooms, but what about beef, or walnuts, or kiwifruit? Would eliminating a grading regulation mean a new fight over the constitutionality of a program because now the industry is “less regulated”? Sooner or later, the Supreme Court will need to be involved, until then, get ready for more litigation.

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Over the last decade or so, two other methods of controlling overuse have evolved, mostly at the advice of economists. One method involves “pricing” the services of natural assets. This generally means taxing or otherwise raising the price of use, and it works by charging users for the service in question, much as a market would if the asset were private. When conventional goods and services become more scarce, their prices typically rise, calling forth both a moderation in their use, and also innovation and development of substitutable goods and services. In contrast, when an unregulated environmental service like the assimilative capacity of a river or the air (or the filtration services of a watershed, or the aesthetic services associated with a natural vista) become more scarce, there is no market feedback mechanism that raises the price to users so that they will alter the behavior that is causing degradation. Programs like emissions taxes placed on each ton of sulfur content in coal are designed to put a “price” on the use of the air to account for its real value in carrying away sulfur-laden waste. In Europe, many countries have instituted taxes on water discharges into rivers that carry away wastes. In principle, this price charged for the assimilative service causes individual users to moderate their demands on the natural assets’ services compared with being able to use them for free. Regulators expect that the totality of all uses will then be kept within the carrying capacity of the system’s ability to absorb waste.

The second type of decentralized policy that is increasingly garnering attention is to actually create property or ownership in a previously unowned resource. The tradeable emission programs for sulfur is an example that has been implemented in the coal-

burning sector of the electric power industry. Emissions-permit programs give each firm or company the “right” to emit a certain amount of pollution. Firms can trade these rights and hence they take on value just like a farmer’s land has value. As permits become valuable, their prices rise, which creates an “opportunity cost” associated with using them. For example, if a firm can reduce emissions by a ton at a cost of \$300, and permits are selling for \$500 per ton, then it pays to adopt the new practices rather than buying a unit of pollution rights. These kinds of schemes involving privatization of natural assets are controversial, and many critics object on an almost gut reaction to the idea of actually giving firms a right to continue to pollute. But these methods are proving to have a dramatic affect on not only the amount of polluting activities, but also on the incentives to develop and adopt newer and cleaner technologies that mitigate the problem in the first place.

The use of property right-based systems will probably continue to supplant cumbersome command and control systems as a method of choice to address the overuse of natural assets in the future. It is even being adopted for use with resources that many claimed could never be “owned.” In commercial fisheries, for example, the U.S. and other countries have used biologically determined allowable-harvest targets together with closed seasons and gear restrictions almost exclusively since World War II. But as protein has continued to grow in value, fish prices have risen, attracting more and more participants. The problem, again, is that commercial ocean fisheries are not “owned,” and hence no one controls the amount of effort attracted to the industry. Imagine, for example,

what would happen if farmers could not own their land and that they could only claim it each year by encircling a plot with a tractor and disc. Think of a scenario in which everyone lined up on the border of each farming state, and then rushed in like the Oklahoma land rush, to stake their claims. What would happen is that farmers would build bigger and faster tractors each year, with the intent of racing out and claiming more of the resource before their neighbors did. Absurd as this sounds, this is exactly what has happened with many of the world’s valuable fisheries. Fishermen have built larger and larger vessels in order to claim a larger share of the allowable harvest, even as total allowable harvest has remained unchanged. As fishing power has multiplied, regulators have had to shorten



seasons, impose efficiency reducing gear restrictions, and close off areas from exploitation. The result has reached ridiculous proportions in some fisheries, with entire seasons conducted over 4-5 days (Pacific Halibut), or even a few hours (Pacific roe herring).

The most interesting solution to the fisheries problem was first introduced in Iceland and New Zealand in the early 1980s. Both countries effectively “privatized” their fisheries, by creating a system of fractional rights to the biologically determined allowable catches for each species. For example, a fisherman might own rights to take .03% of the total allowable catch of orange roughy, and .05% of the allowable catch of red snapper for each year. Under the old system, this fisherman did not own any rights and was forced to rush out to take his harvest as quickly as possible before his neighbor got it. Under the new system, the fisherman can take his fixed quantity when prices are high, when costs are low, or whenever it fits better into his year of activities. Since the permits are also marketable, fishermen can buy and sell them until they hold quantities and portfolios that best fit their skills and management practices.

If there has been a lesson learned over the past several decades of trying to deal with environmental and other social problems, it is that centralized command and control systems are costly, cumbersome and inflexible. In contrast, decentralized systems, whether they price ecosystem services administratively or create property rights and encourage markets, allow individuals to make choices but with a system of altered incentives. It is likely that the future will bring more of both pricing and property rights-based systems, but with a tilt in favor of market solutions. Institutions such as private or public land trusts are purchasing development rights from farmers in order to purchase, on behalf of the public, the aesthetic and other green-space services associated with open agricultural land. Wetlands mitigation banking programs are another example, allowing land development in a



flexible manner that allows growth, but that also preserves the non-market values of wetlands by replacing those lost. These are all examples of new and creative solutions to environmental problems that involve harnessing individual initiatives, but within a system that gets the prices on Mother Nature right.

For more information

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Making Sense of California Milk Standards and Prices

Reader Questions and Author Responses

Editors Note: "Making Sense of California Milk Standards" by L.J. (Bees) Butler, appeared in the Winter, 2000 issue of the ARE Update (Vol. 3 No.2). The article generated a substantial response from our readers, including several additional questions on the topic. In this follow-up, Dr. Butler responds to a few of the more frequently asked questions.

Q: You mention in your article that the fortification of milk involves the addition of extra solids to fluid milk to bring it up to California standards, and that this adds about 16 – 20 cents per gallon to the retail price of milk. Is it not true that part of that extra cost is borne by California milk producers?

A: Yes, it is true that California milk producers pay a fortification allowance on all milk used for fluid milk purposes. Fluid milk processors receive this allowance by deducting the cost of the additional solids added to fluid milks from their pooling obligations. The implications are two-fold. First, if the California standards were replaced by the lower federal standards, producer's income would increase by a small amount. Second, the price at retail would not fall by the full amount of the cost of the fortification.

Q: You mention in your article that sources of calcium in the food chain can be found in milk and in only 3 other vegetables. I thought calcium could be found in spinach and in many other foods. Is it not also true that many foods are now calcium fortified?

A: While it is true that many foods, other than dairy products, do provide some calcium, most foods are not "calcium-rich" in the sense that they provide calcium sufficient to meet the minimum daily requirements recommended by the U.S. Public Health Service. And many of the foods that are relatively calcium-rich are not frequently eaten, or are not eaten in substantial amounts by most Americans. Spinach does have a high calcium content, but the bioavailability of calcium is low due to spinach's high oxalate content. In addition, some foods such as orange juice, bread and some cereals are now being fortified with calcium in an effort to increase the calcium intake of Americans. The average American aged 19 – 50 years old requires a minimum of 1000 mg of calcium per day. Children from 0 – 8 years require less, while those from 9 – 18 years, those over 50 years old, and pregnant and lactating woman, require more. Table 1 contains more information on calcium sources and contents of selected foods.

Q: In your article, you imply that the California milk standards impose an unfair state trade barrier to outside milk, and that milk from other states may not enter California under any circumstances. Is this true?

A: No, it is not true. First, milk in its raw state may enter California from any of the areas surrounding California.

While it is subject to some pooling provisions, California plants regularly receive milk from Oregon, Nevada and Arizona, or from further afield if necessary. Second, any processed fluid milk from out-of-state can enter California, provided it meets the California standards. In fact, the only milk that may not enter California is fluid milk for sale at retail outlets that does not meet California standards.

Table 1. Calcium Sources, Content and RDA Requirements

Food Group/ Item	Calcium (mg)	RDA Req't of Calcium
Bread, Cereal, Rice, Pasta	<25	40.0 cups/slice
Vegetables		
Broccoli (1 cup)	178	5.6 cups
Collards (1 cup)	148	6.8 cups
Kale (1 cup)	94	10.6 cups
Spinach (1 cup)	245	4.1 cups
Other Vegetables (1 cup)	50	20.0 cups
Fruits		
Dates (1 cup)	105	9.5 cups
Figs (10 dried)	269	37.0 dried
Orange Juice (1 cup)	25	40.0 cups
Orange Juice (Ca fort.)	300	3.3 cups
Milk, Yogurt & Cheese		
Whole Milk (1 cup)	288	3.5 cups
Milk, 2% fort. (1 cup)	352	2.8 cups
Milk, skim (1 cup)	296	3.4 cups
Cheese, cheddar (1 oz)	213	4.7 oz
Cheese, swiss (1 oz)	262	3.8 oz
Cheese, cottage (0.5 cup)	115	4.3 cups
Yogurt, lowfat (1 cup)	294	3.4 cups
Meats, Poultry, etc.		
Salmon (3 oz)	16	18.0 oz
Sardines (3 oz)	372	8.1 oz
Navy Beans (1 cup)	128	7.8 cups
Soybeans (1 cup)	175	5.7 cups
Tofu (Ca fort.) (0.5 cup)	258	2.0 cups
Egg (1 large)	27	37.0 eggs
Other Meats (3 oz)	<10	300.0 oz

Source: American Council on Science & Health "Much Ado about Milk," 2nd Edition, New York, NY, February 2000.
Ca Fort. = Calcium fortified

ARE Faculty Profile

Dale Heien grew up in Danville, Illinois, spending time on his grandfather's farm nearby. He began college at General Motors Institute in automotive engineering. Life in a large bureaucratic corporation had little appeal so he moved on to Depauw where he studied economics. He ended up getting a B.A. and M.A. from the University of Illinois. Selling his prized sports car, he financed a sojourn to Europe, where he studied at the Goethe Institute. Crossing the ocean on an Italian freighter, he developed his lifelong taste for fine wines and Italian food.

Upon returning, he took a position with the Department of Labor. Again, the dead hand of bureaucracy struck and he was gone in three weeks, this time to the George Washington University Logistics Research Project. His work on spare parts for Polaris submarines led to statistics and utility theory. Upon receiving his Ph.D. from GWU in 1968, he gave the government its third and last try at employing him. He was appointed chief of the Price Research Division, whose responsibility was implementing the Stigler Committee's recommendations for improving the Consumer Price Index (CPI). This position gave him considerable professional visibility, enabling him to start his own consulting firm.

From 1970-1980 he operated as a private consultant specializing in market analysis. He developed models of the U.S. livestock industry for the Economic Research Service and later used them to analyze the 1970-72 inflation for a Presidential Commission. He served as a consultant to the Cost of Living Council and to the Administration for the GATT round of negotiations. He also gave seminars around the country on econometrics through the Institute for Advanced Technology.

In 1976 he and his wife purchased a cattle ranch located along the Russian River. Two years later they moved to the ranch and began converting it to a vineyard. He continued consulting in the Bay Area as well as working on an NSF Grant. Not wishing to give up his professional interests, he decided to pursue an academic career. This led him back east to Penn State. A couple of years and several publications later he found himself on his way to Davis.

At UC Davis his research interests have centered on demand analysis, especially the demand for farm output and food, the social costs of alcohol abuse and the California winegrape economy. His research



Dale M. Heien
Professor
Agricultural and Resource Economics

centers on grapes and wine, where he is apparently under the delusion that because he grows grapes he knows something about the economics of the industry. Fortunately, his colleagues periodically set him straight.

Professor Heien has taught undergraduate courses in economic theory, econometrics and government regulation of business. He has taught graduate courses in the same areas and in demand and price analysis. He has served as an expert witness in a number of lawsuits involving the winegrape and almond industries.

He is married with three children. His wife and youngest son are jazz musicians and play in several local bands. His oldest son is a sophomore at Berkeley and works on the SETI (Search for Extraterrestrial Intelligence) Project. His daughter, who starts high school next fall, is an avid ballet dancer.

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