

## **ECONOMIC INCENTIVES FOR SOIL CONSERVATION IN THE UNITED STATES**

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### **Abstract**

Nowhere in the world spends more on soil conservation than the United States. Generous investments in subsidies and technical assistance were born of the 1930's when giant dust storms called attention to the plight of soil health. The United States has continued investing ever since. From the early days of government assistance until the early 1980's, conservation was promoted largely by EITS (education, information, technology, and subsidies). EITS worked largely because information was difficult to come by and erosion appeared to be undermining productivity. However, in the late 1970's, researchers observed that farmers had become very educated about erosion prevention and that conservation was tapering off because it was generally not profitable in the short run and often not in the long run either. In the 1985 "farm bill," the country renewed interest in paying farmers to retire land for long periods of time in a Conservation Reserve Program (CRP) and for the first time linked government price and income supports and other benefits to conservation planning. These programs proved remarkably successful and widely popular, though highly costly. The United States appears intent on continuing these programs. Recent farm bills have reaffirmed them and added other programs that support pay for conservation.

Additional Keywords: erosion, subsidies, assistance

### **Introduction**

Almost certainly nowhere in the world spends more on soil conservation than the United States. Generous investments in subsidies and technical assistance were born of the 1930's when giant dust storms called attention to the plight of soil health. The United States has continued investing ever since. From the early days of government assistance until the early 1980's, conservation was promoted largely by EITS (education, information, technology, and subsidies). EITS worked because information was difficult to come by and erosion appeared to be undermining productivity. However, in the late 1970's, researchers observed that farmers had become very educated about erosion prevention and that conservation was tapering off because it was generally not profitable in the short run and often not in the long run either. In the 1985 "farm bill," the country re-emphasized the concept of paying farmers to retire land for long periods of time in a Conservation Reserve Program (CRP) and for the first time linked the receipt of government price and income supports and other benefits to conservation planning. These programs proved remarkably successful and widely popular, though highly costly. The United States appears intent on continuing these programs. Recent farm bills have reaffirmed them and added other programs that support pay for conservation.

It is my opinion that "paying for conservation" is and will be the best description of soil conservation planning in the United States. In the following pages I discuss market or private incentives for conservation, and the evolution of federal conservation programs from the early twentieth Century to the new millennium. I conclude with observations about lessons learned about incentives.

### **Private/Market Incentives**

Of course, conservation is or can be profitable without any help from the government. However, if it was always profitable, it would be ubiquitous in the United States by now, given all the education, technical assistance, cost sharing and other resources that have been offered over the last three quarters of a Century. According to the US Department of Agriculture (2003a), about 58 percent of crop acreage is farmed with some sort of crop residue management; about 36 percent is conservation tillage. That leaves 42 percent that is still tilled intensively. Furthermore, 10 percent of the land in residue is protected by the Conservation Reserve Program (CRP), which pays producers to set land aside in grass or trees. Studies found that most of that land would come back into production. Therefore, conservation does not appear profitable on about half of the US cropland base.

Napier (1990) asserts that farmers engage in practices to maximize short term gains. This would explain why many producers do not adopt conservation, because it is oriented toward long term gains. Of course, there are many factors that effect adoption, such as climate and soil type. A literature review in 1987 (USDA) concluded that economic factors are significant in adoption but that sociological factors are also important, and outweigh economic factors for some farmers. Nevertheless, the foundation for adopting conservation is profit (Miranowski and Cochran, 1993). And, while the impacts are highly variable by location, most of the benefits to conservation

flow to society, not the producer. As Turkelboom *et al.* (1993) suggest, many farmers will have to be compensated to adopt conservation measures because they would be foregoing revenue for the benefit of the environment and society.

The primary benefit of soil conservation to a farmer is saved productivity. However, several studies revealed that, while land owners were aware of soil erosion, they chose not to act (Napier, 1990); without subsidies, conservation was not profitable in the short run and frequently not profitable in the long run (Huszar *et al.*, 1994; Stocking and Tengberg, 1999). Most land in the United States was marginally affected by erosion, but productivity losses did not justify conservation. Napier (1990, p.632) summarized the results of three key studies. In 1977, the Resource Conservation Act indicated productivity would fall by 8 percent in 50 years; a Minnesota study estimated losses at 3-5 percent over 100 years; and Crosson (1984) predicted production losses at 2-3 percent from 1950-1980.

While studies about the relative insignificance of productivity accumulated, evidence was mounting that environmental impacts off the farm were significant. In 1985, the Conservation Foundation estimated off site damage exceeded \$6 billion per year in 1980 dollars (Table 1). A seminal book was published, entitled *Eroding Soils: The Off-Farm Impacts* (Clark *et al.*, 1985) that delineated many of the consequences of erosion that occur off the farm, and their costs. An important contribution from their efforts was to show that cropland is not responsible for all of the off site damages, since erosion occurs naturally and from other economic activities such as ranching and mining. About one-third of the cost stems from cropland erosion. Kerry Smith (1992) estimated that the off site costs of erosion are about 4.5 percent of sales. Assuming a 5 percent productivity loss over 100 years, 150 bushel/acre yield, and \$3/bushel, productivity losses add up to only about 0.05 percent. Therefore, productivity losses are perhaps one percent as much as off site costs. In the end, producers have little motivation to adopt conservation when

**Table 1. Off farm damage costs in million 1980 dollars (source: Clark *et al.*, 1985)**

Type of Impact	Cost	Cropland Share
<b>In-Stream Effects</b>		
Biological	No estimate	
Recreational	2,000	830
Water storage	690	220
Navigation	560	180
Other	900	320
<i>Subtotal</i>	<i>4,200</i>	<i>1,600</i>
<b>Off-Stream Effects</b>		
Flood damages	770	250
Water conveyance	200	100
Water treatment	100	30
Other	800	280
<i>Subtotal</i>	<i>1,900</i>	<i>660</i>
<b>Total</b>	<b>6,100</b>	<b>2,200</b>

off-site costs are high because these costs are external to their operations.

In conclusion, I have shown, or asserted, that:

- Profit is the most important incentive;
- Conservation is not profitable everywhere;
- Some producers will adopt conservation measures even if they are not profitable; and
- About 99 percent of the benefits from conservation occur off the farm.

### **The Evolution of Federal Conservation Programs**

The public has an interest in creating policy incentives since conservation does not appear always to be profitable, and because society receives most of the benefits. Lengthy, detailed descriptions about the development of soil conservation policy in the United States can be found in National Research Council (1993), Napier (1990), Weber and Marheim (2000) and USDA (2003a and 2003b). A summary is presented here in order to provide context about how and why the programs in the United States evolved. Arguably, before 1985, most policy was focused on agricultural capital, that is, productivity. During the 1960's and 1970's, awareness grew about the minimal impacts of conservation on productivity and the very large impacts off the farm. In 1985, the omnibus federal farm policy, the "Farm Bill," officially changed focus to environmental capital, and to a lesser extent social capital. Farm Bills are passed roughly every five years, so I conclude the discussion about evolution with the 2002 farm bill. My scope is too limited to discuss state and local policy, or private interest groups.

#### *Agricultural capital policy era*

People have known about the destructive nature of soil erosion in the United States for over 200 years. Early on the availability of frontier land for expansion rendered conservation relatively unimportant, so few people paid attention (Napier and Napier, 2000; Weber and Margheim, 2000). All that changed in the 1930's. Farming practices set the stage for THE "Dust Bowl," one of America's greatest catastrophes, when a drought settled over

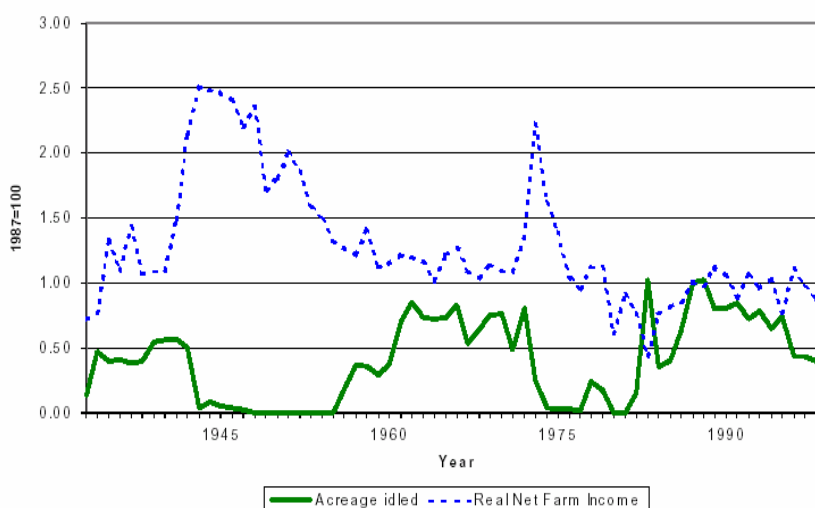
the mid-west. Giant clouds of dust swelled over cities a hundred miles away like a fog you could touch. A public already down from the economic depression was ready to act on soil conservation.

While Congress was ready to act, it was in no mood to put the cost of conservation on the backs of farm producers. And a more pressing issue was failing farms. Prices in 1933 were 50 percent lower than in 1929. That year, Congress passed the Agricultural Adjustment Act of 1933 (AAA) to support producer incomes. Later, in 1935, Congress created the Soil Conservation Service (now called the Natural Resources Conservation Service). The primary role of this agency was to provide technical assistance for conservation measures on farms and ranches. And, importantly, it was based on helping producers that voluntarily adopted conservation measures. In an important twist, the Supreme Court ruled the AAA unconstitutional in 1936. This legal action set the stage for paying producers for conservation; a legacy that stuck. “Policy makers, anxious to continue the supply adjustment program despite the ruling, found a way to use soil conservation as a vehicle for income support” (National Research Council, p. 150). Producers began being paid to set aside land from soil-depleting crops, which were the same crops that received income supports because they were in excess supply. Therefore, farmers got both their income supports and conservation incentives.

From the 1930’s until the 1960’s Federal policies emphasized education, information, technology, and subsidies (EITS). EITS was successful at first because farmers had seen what erosion can do. Perhaps part of the reason it worked was that the technologies were relatively easy to apply at first. However, voluntary adoption, encouraged by EITS, gradually peaked and many began to question whether it was enough (Napier, 1990; Sanders and Cahill, 1999; Hussar, 1999; Stocking and Tengberg, 1999). A 1977 report by the General Accounting Office found federal resources for conservation were not directed effectively toward critical conservation needs. Erosion was still a serious problem, despite decades of programs (Halcrow *et al.*, 1982). A 1983 report by the GAO concluded the same basic point as reflected in its title: Agriculture’s soil conservation programs miss full potential in the fight against soil erosion. Furthermore, the report concluded that commodity programs aimed at supporting farm income worked at cross purposes with conservation programs and goals.

“From their inception, soil conservation programs were designed to support farm income and production as well as to reduce soil erosion” (National Research Council p. 152). This is readily seen in Figure 1. As shown in this USDA study, subsidies for conservation programs increased when prices fell (with a 2-3 year lag), and fell back again when the crisis was past. The greatest expenditures on conservation occurred just after the largest price drops. Lucrative land retirement programs were offered, which coincidentally also curbed commodity supplies, which brought prices back up. For example, expenditures on the Conservation Reserve Program (CRP) lagged 2-3 years behind the price troughs in 1986-87. The Soil Bank (1956-72) brought land out of production and reduced supplies during a long decline in prices that began in 1953.

While soil conservation programs could be used successfully to boost farm incomes, the reverse proved more problematic. That is, farm income supports probably worked at cross purposes with soil conservation efforts. The National Research Council study (1993) found mixed results about the net effect of income support programs. They do offer the wrong conservation incentives, but may not have much influence compared to other production incentives. The importance is also diminished because the programs were altered to reduce perverse incentives.



**Figure 1. Net real farm income and land idled under annual and long-term federal agricultural programs**

In conclusion, I have shown, or asserted, that:

- Conservation is voluntary in the US;

- The focus before 1985 was on agricultural capital;
- EITS focus effective at first, then waned;
- Income supported through conservation incentives; and
- Income supports counteract conservation incentives.

#### *Environmental capital policy era*

In 1985, a policy revolution occurred with regards to soil conservation. Conservation provisions in the 1985 farm bill, called the Food Security Act of 1985 (FSA), were hailed as “the most significant in 50 years.” (Zinn, 1991, p 45). The bill included environmental impacts on farms for the first time. The emphasis had changed to environmental capital, which includes agricultural capital. Conservation expenditures doubled from 1985 to 1995, showing a renewed commitment to conservation. The first 50 years of subsidies, prior to 1980, cost less (\$18 billion) than the CRP from just 1985-1997 (\$19 billion) (GAO, 1983 : Hoag, 1999). Three conservation programs were born: the Conservation Reserve Program (CRP), Highly Erodible Land Protection, which includes Sodbuster (SB) and Conservation Compliance (CC), and Wetland Protection, which includes the Swampbuster program.

Set aside programs have been a staple of US policy since 1933, including diversions for commodity price and income support programs and conservation programs like the Soil Bank in the 1950’s and 1960’s. However, the CRP marked a change in policy due to its size and emphasis on conservation instead of price and income support. At first, the primary goal of the CRP was to reduce erosion. However, in subsequent farm bills in 1990, 1996 and 2002, the shift in emphasis to environmental capital can be seen as the goals were expanded via an Environmental Benefits Index (EBI). After the 1996 Farm Act and beginning with Signup 15 of the CRP, the EBI was redefined as the sum of six environmental factors and a cost factor:

- Wildlife habitat benefits (100 points maximum);
- Water quality benefits from reduced water erosion, runoff, and leaching (100 points maximum);
- On-farm benefits of reduced wind or water erosion (100 points maximum);
- Long-term benefits of cover such as trees, likely to be maintained beyond the contract period (50 points maximum);
- Air quality benefits from reduced wind erosion (25 points maximum);
- Benefits from enrollment in conservation priority areas and addressing the resource concern of the area (25 points maximum); and
- Cost (points determined by USDA after signup; was 200 points maximum for signup 15).

The CRP ranges from 30 to 40 million acres, about 10 percent of cropland. Erosion during the first 15 years of the program was reduced by about one third. USDA (2003b) estimates that the value of off farm benefits significantly exceeds on-farm productivity benefits as discussed earlier.

The other big change in 1985 was CC. This program required producers with highly erodible land to file an approved conservation plan in order to collect most types of income and price supports. Conservation Compliance put conservation plans on 130 million acres. Economists predicted that these plans returned more than twice as many benefits as they cost and cut erosion by 30-50 percent (Hoag, 1999). The Sodbuster program assured that highly erodible land would not be converted to cropland, thus exacerbating the CC problems.

Over the years, the following farm bills in 1990, 1996 and 2002 added new programs. One of these was EQIP (Environmental Quality Incentives Program). This program was designed to consolidate several programs and to help states target funding better to meet their needs. EQIP uses a locally led process to adapt national priorities to address local resource concerns. Subsidies are in essence repackaged to address local needs. Another program was WHIP (Wildlife Habitat Incentives Program) that provides cost sharing for landowners to develop habitat.

In conclusion, I have shown, or asserted, that:

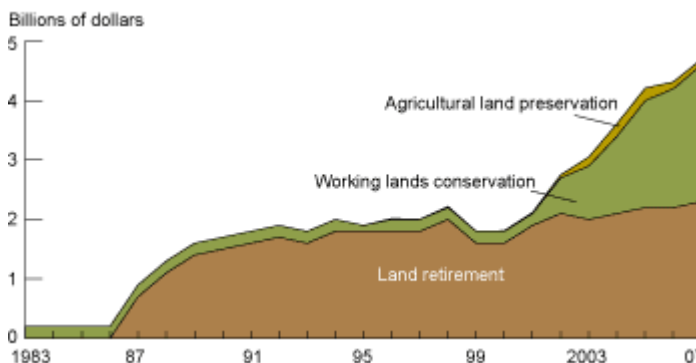
- 1985 marked a change from agricultural to environmental capital;
- Introduced new and significant conservation programs like CRP; and
- Evolved to include new programs.

#### *The new millennium*

Between 1985 FSA and the 2002 farm bill, called the Farm Security and Rural Investment Act (FSRI), most conservation funding was for land retirement. The FSRI maintained that commitment and moved even further

toward conserving environmental capital. By 2007, funding levels will double compared to 10 years earlier (Figure 2). Spending increases from about \$2 billion per year to nearly \$5 billion in 2007. Two thirds of the increased funding must go to conservation on working lands, actively producing crops or livestock. EQIP funding increased five fold to \$5.8 billion for 2002-2007 and two very new programs were introduced, the Conservation Security Program (CSP) and the Farmland Protection Program.

CSP marks a significant change in policy because it pays producers for conservation practices they already installed. These payments “serve as a reward for achieving a high level of conservation and as an incentive to maintain and improve that level of conservation performance (Claassen, 2003). Producers can choose among three tiers, with higher tiers receiving greater payments. Tier 1: producers must address at least one resource concern on at least part of the farm. Contracts are for 5 years. The limit is \$20,000 per year. Tier 2: Producers must address at least one resource concern on the entire farm. Contracts are for 5-10 years. The limit is \$35,000 per year. Tier 3: Producers must fully address all resource concerns on the entire farm. Contracts are for 5-10 years. Payments are limited to \$45,000 per year. Payments are composed of three components: a base payment, a cost-share and an enhancement payment. The base payment is a percentage of national average land rental (e.g. 5 % for tier 1, 10 % for tier 2, and 15 % for tier 3). The cost-share is up to 75 %. Enhancement payments can be provided for taking additional actions, such as implementing or maintaining practices that exceed minimum requirements. The cost of the program may not exceed \$3.8 billion over 10 years, but costs including financial assistance for base payments, cost sharing, maintenance and enhancement and technical assistance are estimated to be nearly \$70 billion, based on expected interest by producers (\$33.3 base, \$17.1 installation, \$3.4 maintenance, \$6.2 enhancement, and \$9.8 tech assistance).



**Figure 2. Proposed spending, 2002 Farm Bill**  
Source: Claassen, 2003, p. 40

The Farmland Protection Program (FPP) is also very unique. It provides funds to government or private organizations to help purchase development rights and keep farmland in agricultural use. A total of \$597 million was allocated for 2002-2007.

Finally, a Grasslands Reserve Program was also created to preserve and improve native-grass grazing lands. This CRP-like program is funded at 254 million for 2002-2007. Contracts can be secured for 10-30 years, or permanently to improve or maintain high-quality native grassland.

In conclusion, I have shown, or asserted, that:

- FSRI increased commitment and spending on conservation;
- Introduced CSP, FPP and GRP; and
- Established pay for conservation already achieved

### Conclusions

Based on the public’s willingness to offer generous subsidies for conservation, private, market incentives do not appear adequate to provide a sufficient level of conservation in the United States. Conservation may be profitable on about half of the cropland without subsidies. Given private incentives are insufficient alone, and that social benefits may exceed producers’ by nearly 100 fold, the public has incentive to offer subsidies for farmers to adopt conservation technologies. There has been a strong upward trend since 1985 to increase subsidies, especially in place of income supports

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