Resource Conservation Programs in the Farm Policy Arena

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ABSTRACT

Maintaining our agricultural productive capacity over time is the primary stated focus of soil and water conservation programs. To assess the role of these resource conservation programs in developing future legislation, an understanding is needed of the soil and water resource problems, the rationale for conservation spending, the historical evolution of the programs, and the effectiveness of current programs. This information can then be used to achieve greater efficiency in future conservation programs and to realize improved consistency between conservation and commodity programs.

KEYWORDS: Agricultural Conservation Program, commodity programs, conservation programs, consistency, cost-sharing, erosion, soil, soil and water resources.

INTRODUCTION

American farmers have combined the Nation's abundant soil and water resources with modern farm technology, purchased inputs, and skilled labor and management to form an extremely productive agricultural system. U.S. agriculture has been able to satisfy domestic and foreign demands for food and fiber, but the sector is burdened with surplus production and the public is concerned over the cost of Federal farm programs.

Under these circumstances, a number of questions are being raised. First, are Federal soil and water conservation programs really needed? Second, are current soil and water conservation programs effective in accomplishing their objectives? Third, are programs designed to support commodity prices and farm incomes compatible with soil and water conservation objectives? Finally, are there other programs, more consistent and less costly, that could meet both farm commodity and conservation objectives? This article attempts to provide some insights and answers to these questions.

It is important to recognize that soil and water resource use will change gradually over time. Occasionally, there are temporary, dramatic changes in resource use such as occurred in 1983 under the Payment-in-Kind (PIK) Program, but such changes are the exception more than the rule. With anticipated conservation programs, commodity demands, and capital investments, no significant short-term changes in resource use are expected even if Federal soil and water conservation programs are modified. The productivity and environmental impacts of soil erosion and water use are gradual but cumulative over time. Schultz (15)

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has noted that society is preoccupied with shortrun supply shocks, but that longrun supply shifts may be far more significant. Similarly, long-term soil and water resource problems and solutions are far more important than the short-term issues, which can benefit from a long-term framework.

During 1985, Congress will develop legislation to succeed the Agriculture and Food Act of 1981. The 1981 farm bill included a "conservation title" that was not integrated into the legislative package. Ultimately, little of the title was implemented. Various interest groups have expressed a strong preference for an integrated conservation title in the 1985 farm bill. Given the importance of consistency between Federal programs for agriculture and the size of Federal expenditures to aid agriculture, an integrated soil and water conservation title has substantial public support.

This article begins by reviewing the nature of the resource problem and the rationale for Federal spending on soil conservation. It then considers the degree to which current programs maintain the longrun productivity of soil and water and the consistency between Federal conservation and farm commodity programs. The final section discusses some proposed modifications to better integrate conservation policies with other program objectives and to make them more cost-effective.

NATURE OF THE CONSERVATION PROBLEM

The public is clearly aware that soil and water resources are not unlimited and that the natural environment has limited capacity to absorb runoff without serious adverse effects. At the same time, recent shifts in the supply-demand balance for agricultural products have led to substantial excess capacity in farming.

Under these circumstances, should the public be concerned with the conservation of soil and water resources or with the adequacy of farmers' capacity to produce? Although we do not need to be concerned with current shortages, the Nation does need to sustain productive capacity to satisfy future domestic and export demands for food, feed, and fiber.

Our future productive capacity will depend on the judicious use of soil and water resources over time, the feasibility of substituting purchased inputs, such as fertilizers, for natural resources, and the rate of future technological change. Because purchased input prices may exhibit relative increases over time and continued technological progress is uncertain, heavy reliance on substitute inputs and technological progress is risky. Also, profligate water and soil resource use in the present and heavy reliance on purchased inputs and technology in the future may increase the adverse environmental impacts of nonpoint source pollution (that is, pollution which cannot be traced to a specific source).

Few would deny that we have soil and water use problems. But how these problems are described can make a big difference in how they are perceived and in what approaches are taken to solve them. For example, quoting average erosion rates and potential yield losses, either for the Nation or for individual States, is inadequate. Not all cropland is subject to productivity-threatening erosion. Erosion is a concentrated problem, threatening a relatively small portion of cropland, but in some regions more than in others.

Based on 1982 National Resources Inventory (NRI) data, which quantifies the seriousness of the soil erosion problem, only 7 percent of U.S. cropland was eroding at rates that would pose a serious threat to longrun productivity. Table 1 provides an indication of the variation in average annual cropland erosion rates between States. To illustrate the variation in erosion rates within and between States, table 2 indicates the cropland acres eroding below tolerance or T (the rate that poses no threat to longrun productivity), between T and 2T, and greater than 2T. As Cook (3) discusses, the use of tolerance levels may overstate the problem. On soils having deep favorable root zones, the allowable soil loss of 5 tons per acre is arbitarily low. There is little if any scientific basis for a maximum 5-ton-per-acre tolerance level and only a very limited scientific basis for lower tolerance values. Additionally, economic considerations were not taken into account in establishing T values.

Similarly, declining groundwater levels are a serious problem in some irrigation regions, but not a universal problem. The data in table 3 indicate the irrigated area with declining groundwater supplies in the 11 major groundwater irrigation States in 1977. In addition, the rate of decline is highly variable within and between States. Some recharge is occurring in many areas, but generally at rates that are exceeded by withdrawals.

Although the jury is still out on the productivity impacts of soil erosion, recent research by USDA and others (5, 9) indicates that the productivity impacts of soil erosion may be less serious on most soils than initially hypothesized. Also, eroding soil and declining groundwater tables do not in and of themselves indicate the existence of a natural resource problem or the misallocation of natural resources over time in an economic sense. Given the relatively slow rates of soil genesis on many soils and water recharge in many aquifers, any erosion or pumping will reduce natural resource stocks. Society's goal is to allocate these resource stocks over time so as to maximize the well-being of current and future generations.

Although uncertainty about the future always surrounds such allocation decisions, market forces may be capable of achieving the desired allocation of soil and water productivity over time. For example, if farmland purchasers recognize the soil productivity consequences of soil erosion and adequately reflect these foregone earnings in their bids to purchase farmland, then the market will send signals to landowners with respect to the economic consequences of allowing soil to erode. On the contrary, if farmland purchasers ignore soil erosion impacts, society may infer that the market system is failing and that a more significant form of Government intervention is necessary to protect future soil productivity. Two studies (10, 11) that shed some light on this issue indicate that soil quality differences are reflected in farmland prices in Iowa and that the market valuation of soil quality characteristics (for example, topsoil depth or potential erosivity) reflects potential productivity losses. Although further research is needed to verify and extend these results, the initial results do indicate an important role for the marketplace in conserving soil resources.

The marketplace does not account for off-site impacts of soil erosion and groundwater mining. Such impacts may destroy fish and wildlife habitats, reduce recreational opportunities and flood protection, increase water treatment costs, reduce water availability for competing use, and contaminate water. There is public concern that these external effects are receiving inadequate attention. Because such externalities are ignored in market transactions, food, feed, and fiber prices do not reflect the true cost that the public is incurring for agricultural products. Future demands for control of soil erosion and groundwater use may come from groups who are adversely affected. This implies different program strategies to achieve specific policy objectives.

Table 1--Average annual cropland erosion from wind and water (sheet and rill)

State	Wind	Sheet and rill	Total
		Tons per acre	
Alabama	0	7.1	7.1
Arizona	3.3	.5	3.8
Arkansas	0	4.9	4.9
California	1.1	1.2	2.2
Colorado	9.3	2.2	11.5
Connecticut	0	2.8	2.8
Delaware	1.8	2.0	3.8
Florida	.9	2.0	3.0
Georgia	0	6.4	6.4
Hawaii	0	6.4	6.4
Idaho	2.9	5.0	7.9
Illinois	0	7.0	7.0
Indiana	.6	5.5	6.1
Iowa	2.7	9.4	12.0
Kansas	2.8	2.7	5.5
Kentucky	0	9.5	9.5
Louisiana	0	4.6	4.6
Maine	0	2.1	2.1
Maryland	.2	5.0	5.2
Massachusetts	0	2.1	2.1
Michigan	1.6	2.2	3.8
Minnesota	3.9	2.5	6.4
Mississippi	0	7.5	7.5
Missouri	0	9.8	9.8
Montana	8.3	1.6	9.9
Nebraska	1.3	5.2	6.5
Nevada	9.2	.1	9.3
New Hampshire	0	1.2	1.2
New Jersey	.1	5.7	5.8
New Mexico	5.2	1.3	6.5
New York	0	3.0	3.0
North Carolina	0	6.8	6.8
North Dakota	3.1	1.9	5.0
Ohio	.2	3.7	4.0
Oklahoma	3.3	2.2	5.5
Oregon	1.7	4.0	5.7
Pennsylvania	0	5.3	5.3
Rhode Island	0	2.5	2.5
South Carolina	0	3.6	3.6
South Dakota	2.7	2.6	5.3
Tennessee	0	10.0	10.0
Texas	13.1	2.6	15.8
Utah	2.5	.8	3.3
Vermont	0	1.3	1.3
Virginia	.2	6.2	6.4
Washington	2.1	4.8	6.9
West Virginia	0	2.6	2.6
Wisconsin	1.4	4.5	5.9
Wyoming	.7	1.0	1.7

Source: 1982 NRI.

Table 2--State distribution of average annual cropland erosion (sheet, rill, and wind) by T value, 1982

State	Less than T	Between T and 2T	More Than 2T	Share of cropland acres above 2T
		1,000 acres		Percent
Alabama	1,951	1,297	1,261	1.3
Arizona	1,007	56	142	.1
Arkansas	4,796	2,386	918	.9
California	9,584	309	623	.6
Colorado	4,120	2,122	4,359	4.5
Connecticut	189	27	27	1/
Delaware	644	114	56	1/
Florida	2,751	550	255	.3
Georgia	3,495	1,838	1,234	1.3
Hawaii	326	60	41	1/
Idaho	3,963	1,118	2,206	2.3
Illinois	14,500	5,506	4,720	4.9
Indiana	8,093	3,210	2,476	2.6
Iowa	7,390	7,822	11,228	11.6
Kansas	17,851	6,928	4,338	4.5
Kentucky	3,521	788	1,624	1.7
Louisiana	4,237	1,713	457	.5
Maine	485	156	111	.1
Maryland	1,125	342	327	.3
Massachusetts	261	15	20	1/
Michigan	6,677	1,798	967	1.0
Minnesota	10,192	7,831	4,999	5.2
Mississippi	4,405	1,545	1,464	1.5
Missouri	7,774	2,099	5,124	5.3
Montana	7,369	3,580	6,247	6.4
Nebraska	13,471	3,193	3,611	3.7
Nevada	114	23	55	1/
New Hampshire	81	4	4	1/
New Jersey	561	213	182	.2
New Mexico	1,562	300	550	.6
New York	4,295	818	798	.8
North Carolina	4,218	1,027	1,449	1.5
North Dakota	15,569	7,908	3,560	3.7
Ohio	8,477	2,429	1,540	1.6
Oklahoma	7,528	1,977	2,062	2.1
Oregon	2,364	656	1,335	1.4
Pennsylvania	3,682	839	1,375	1.4
Rhode Island	18	5	3	1/
South Carolina	2,879	394	304	.3
South Dakota	9,886	4,517	2,543	2.6
Tennessee	2,785	902	1,904	2.0
Texas	13,628	5,124	14,566	15.0
Utah	1,629	170	239	.2
Vermont	582	40	25	1/
Virginia	2,153	512	731	.8
Washington	4,097	1,576	2,119	2.2
West Virginia	969	45	78	1/
Wisconsin	6,728	2,498	2,229	2.3
Wyoming	2,275	197	114	.1

1/ Less than 0.1 percent.
Source: 1982 NRI.

HISTORICAL PERSPECTIVE

Natural resource conservation is not a new farm policy issue, but over the years the intensity of concern has heightened and its focus has shifted considerably. The need to conserve soil to maintain agricultural productivity of land was recognized in colonial times and was advocated by such leaders as Thomas Jefferson (13). However, it was labor rather than land that limited agricultural production possibilities in the 18th and 19th centuries. Land and water resources, a large share of which had never been tapped for agriculture, were viewed as greatly abundant. If soil was depleted on a given unit of land, there always was the opportunity to move westward and develop new land for cultivation. This was encouraged by the Homestead Act of 1862, which heavily subsidized private ownership and cultivation of new land. This historical period might be considered an "Age of Apparent Abundance" with respect to natural resource perceptions and policies.

Enter the Great Depression of the early thirties, accompanied by severe drought, and public awareness of soil erosion and water availability suddenly increased. Farmers, particularly those in the Great Plains, suffered relatively more from the depression than did many other members of the society. Public sympathy for the farmers' plight was great. Public opinion with regard to agriculture focused on farm income, unemployment, and soil loss, and was fueled by graphic depictions of destitute farm families fighting the duststorms on their drought-stricken land. Similar concerns with income and unemployment in all sectors of the economy led to the election in 1932 of Franklin D. Roosevelt and the initiation in 1933 of Roosevelt's New Deal programs.

The first publicly financed conservation project was authorized by the National Industrial Recovery Act of 1933. This act, which established the Civilian Conservation Corps, initiated an effort to jointly ease unemployment and reduce soil erosion by employing large numbers of people to carry out conservation projects on Federal land. During that same year, $5 million was allocated to the Department of the Interior to conduct research on soil erosion and use

Table 3--Areas irrigated by water source in 11 major groundwater irrigation States, 1977

State	Total irrigation	Total groundwater irrigation	Groundwater decline area irrigated
		1,000 acres	
Arkansas	1,698	1,400	407
Arizona	1,150	940	734
California	8,190	4,388	1,814
Colorado	2,470	1,650	570
Florida	2,918	1,076	250
Idaho	3,934	1,149	150
Kansas	3,158	3,083	1,995
Nebraska	7,165	5,855	1,842
New Mexico	1,240	760	560
Oklahoma	951	730	507
Texas	8,900	7,846	6,425

Source: (17).

relief labor to demonstrate soil conservation practices to managers of private as well as public land. In 1935, this program was made permanent through passage of the Soil Conservation Act, responsibility for the program was shifted to the USDA, and the Soil Conservation Service (SCS) was established.

Concurrent with the initiation of a strong Federal role in soil conservation were efforts to adjust agricultural production and thus to stabilize prices. The first attempt at this objective, the Agricultural Adjustment Act of 1933, was judged by the U.S. Supreme Court to be unconstitutional in 1936. This act's replacement, the Soil Conservation and Domestic Allotment Act of 1936, closely correlated soil conservation objectives with production adjustment goals. It gave USDA's Agricultural Adjustment Administration responsibility for implementing a "temporary" program. The program established a soil-depleting base (defined as total acreage of intensively cultivated row crops) and a soil-conserving base (defined as acreage devoted to grasses, legumes, green manure, and certain other crops as of 1935) for each participating farm (13).

Program participation was voluntary. Farmers were offered direct payments for shifting acreage from soil-depleting to soil-conserving crops, and cost-share assistance for soil conservation practices was provided. The focus of this program was on production adjustment. Its linkage with soil conservation was the fact that the crops that, in their then-current locations, presented the greatest threat of erosion also were the crops for which production adjustments were required. Whether contrived or purposeful, this program maintained a close integration of soil conservation and commodity production objectives. Its implementation ushered in the first of several brief historical periods of close commodity and conservation program consistency. The luxury of acreage set-asides for conservation purposes is easily afforded during such times of surplus. However, due to changes in farming practices, economic conditions, program provisions, and public opinion, the consistency between commodity and resource conservation programs has deteriorated considerably since World War II.

Throughout the late thirties and early forties, SCS programs provided soil conservation technical assistance, as they continue to do today. Since 1937, SCS has provided technical and financial assistance to farmers for flood control and the development of water resources as well. The Agricultural Conservation Program (ACP) administrated by the Agricultural Adjustment Administration and its successors (now the Agricultural Stabilization and Conservation Service) also continues to function. But, where prior to World War II ACP mainly was used to divert land from soil-depleting crops, its postwar primary role has been in cost-sharing farm-level implementation of conservation practices. Increased demand during the war years required that additional land be brought back into production, thus negating the production-adjustment advantages of reserves.

By the late forties, problems with surplus production and low farm prices recurred. The Agricultural Act of 1949, which remains the permanent legislative basis for today's farm programs, addressed this problem by devising a system of price supports for major food and feed grain crops, cotton, and dairy production. Surplus problems persisted into the fifties. In 1953, the USDA tried to eliminate production-oriented practices from those that could be cost-shared through ACP. But Congress denied this change, maintaining some linkage between production and conservation programs. In 1956, a new coordination of commodity and conservation goals was attempted through the Soil Bank Program. Farmers entered long-term (3- to 10-year) contracts under which they were paid to divert crop acreage into conservation uses. The Great Plains Conservation Program, also authorized in 1956, entitled farmers in the drought-susceptible Great Plains to contract with USDA for a period of 3 to 10 years to cost-share the application of long-term conservation practices, including reversion of cropland to permanent grassland. The Soil Bank Program terminated in 1958, and by 1972 all acreage conserved in the "bank" was eligible for recultivation. The Great Plains Program continues today and is authorized through 1991.

The last 25 years have been characterized by increased divergence between Federal commodity and resource conservation programs. Program provisions require only that land placed in set-aside or diversion programs be protected from erosion by the planting of an appropriate cover crop. The Food and Agriculture Act of 1965 further refined the role that acreage reduction of any kind could play in production adjustment. By the early seventies, when export demand for U.S. agricultural products surged, there seemed no need for production restrictions. In fact, farmers were encouraged, both as stated policy and through strong price supports, to "plant fence row to fence row." This they did. Now we find ourselves again in a situation of overproduction.

While farm program administration has become more specialized to achieve different goals, so too have conservation programs become more focused on single objectives. The 1977 Food and Agriculture Act restricted provision of ACP assistance to land on which an identified resource problem was demonstrated to exist. The 1980 act went further in stating that "(ACP) cost-sharing will not be used for carrying out measures that are primarily production-oriented or that have little or no conservation or pollution benefits" (20).

The refined specification of Federal conservation programs arose in part from criticism that the now almost 50-year-old SCS and ACP programs were not cost-effective in reducing soil erosion (20). Congressional scrutiny of the programs led in 1977 to the initiation of the Soil and Water Resources Conservation Act (RCA). Under RCA, resource problems were to be documented, past programs evaluated, and current programs improved. The RCA process has broadened the base of popular support for soil and water policy decisionmaking. But the focus of current public opinion, unlike that of the thirties, is more on the off-site damage and long-term consequences of soil erosion.

Thus, at the present time, U.S. agricultural price and production programs are divorced from resource conservation objectives, and agricultural resource conservation programs have become isolated from price and production goals. We are in an "Age of Divergence".

The basis for heightened concern in this Age of Divergence may be illustrated by recapping the history of commodity and conservation policy for a hypothetical unit of land in the Great Plains. It is entirely possible that a plot of land in this area was first cultivated under subsidization through the Homestead Act in the late 1800's. In the early thirties, the land was likely decimated by drought and wind erosion, becoming unproductive. In 1936, the landowner might have been paid with public funds to replant the land to grasses. In the early seventies, the owner, encouraged and supported through a variety of agricultural programs to cultivate the land for production of export crops, likely adopted irrigation to increase productivity, and began drawing down groundwater levels. Currently, both price support and disaster payments may be going to the owner to encourage continued production on this vulnerable land, but ACP or Great Plains program payments may also be going to the same owner to prevent soil erosion and water depletion during this period of overproduction. It is no wonder that the public is raising questions regarding consistency between programs.

CURRENT CONSERVATION PROGRAM EFFECTIVENESS

Current conservation programs, as we have seen, grew out of the era of depression and the dust bowl. Given the need for economic relief and recovery, soil and water conservation programs were organized to spread benefits among as many farmers as possible, reduce soil- and water-depleting (surplus) crop production, and improve farm incomes. Over the last 50 years, however, the economic structure of agriculture has changed considerably while only limited changes have been made in conservation programs. Consequently, the programs have come under increasing criticism for a number of shortcomings.

First, conservation practices are not being applied to the most severe problem areas. For example, the 1980 Agricultural Conservation Program Evaluation (19) found that 52 percent of erosion control practices were installed on lands eroding at less than 5 tons per acre per year. On many soils, up to 5 tons is considered tolerable and not threatening to longrun cropland productivity. Moderate erosion threats (5-14 tons per acre per year) were occurring on 9 percent of the sample farmland, which was receiving 27 percent of the soil conservation practices. Lands suffering serious erosion threats accounted for 84 percent of the excess erosion, involved only 4 percent of the sample farmland, and received only 27 percent of the practices. The American Farm Bureau estimated in 1981 that "less than 5 percent of the total SCS budget is . . . being utilized to finance erosion control measures on cropland with an excessive erosion problem" (20).

Second, much concern has been expressed over the cost-effectiveness of current soil and water conservation programs. Previous studies raise some serious questions about the efficiency of current program initiatives. Table 4 indicates the distribution of Federal soil conservation expenditures that can be allocated to the State and regional level, the percentage of U.S. cropland eroding in excess of two times tolerance level, and the share of U.S. cropland gross erosion in the 10 major agricultural regions. Although there is some disagreement over the comparability of the estimates, the sheet and rill (water-based) erosion estimates are combined with the wind erosion estimates

Table 4--Distribution of 1983 soil conservation expenditures and 1982 NRI soil erosion estimates

Region	Share of Federal soil conservation expenditures	Share of total cropland with erosion exceeding 2 T	Share of of total gross erosion
		Percent	
Northeast	8.7	2.8	2.3
Lake States	8.0	8.5	8.3
Corn Belt	18.4	26.0	25.4
Northern Plains	10.8	14.5	17.0
Appalachian	13.1	6.0	6.0
Southeast	10.6	3.2	1.7
Delta States	7.0	2.9	4.1
Sothern Plains	12.3	17.1	19.4
Mountain States	5.6	14.2	12.6
Pacific	4.3	4.2	3.3

to compare the distributions of conservation funding and soil erosion. The distribution of cost-sharing and technical assistance expenditures among States does not reflect the distribution of soil erosion among States. Additionally, the distribution of conservation funds by States has witnessed few significant changes over the last 50 years, in spite of major shifts in the location of crop production and erosion problems (16).

The ACP Evaluation (19) also found significant variation in the average cost of erosion practices cost-shared by the ASCS in the sample counties. The average cost of saving a ton of soil over the life of a practice ranged from $14.87 per ton on cropland eroding less than 5 tons per acre to $0.22 per ton on cropland eroding at rates over 50 tons per acre. The study concluded that over three times as much erosion control could be achieved with effective targeting of the same conservation expenditures.

A current payment limit of $3,500 per farm spreads the benefits of conservation financial assistance over a larger number of farms but may reduce program efficiency. Again relying on the ACP evaluation sample of farms and the $2,500 payment limit that existed when the evaluation was completed, farms under 300 acres comprised 71 percent of farms and 17 percent of the farmland, and they received 65 percent of the cost-sharing practices. Farms over 500 acres comprised 16 percent of farms and 72 percent of land but received only 20 percent of the practices. Soil conservation needs are more likely to be correlated with land area than with farm numbers.

Finally, the environmental impacts of soil and water use in agriculture are receiving inadequate attention in current soil and water conservation programs. The highest priority of these programs has been to maintain a productive agricultural resource base. But efforts to conserve soil and water do have significant impacts on stream and lake water quality, stream flows, and ground-water drawdown. These impacts may enhance fish and wildlife habitat, increase recreational opportunities, and produce other amenity benefits. However, efforts have not emphasized targeting financial and technical assistance toward improvement of environmental quality.

The SCS and the Agricultural Stabilization and Conservation Service (ASCS) do have major efforts underway to respond to efficiency and allocative concerns. They have modified current programs to target technical and financial resources to problem areas, to reallocate the conservation funds among States based on conservation needs, and to focus program initiatives on priority problems identified through ongoing program evaluation activities (18). These program adjustments have increased the cost-effectiveness of soil and water conservation activities, but additional gains remain to be realized. Also, efforts are underway to identify the magnitude of the environmental impacts associated with water and soil use in agricultural production.

RELATIONSHIPS AMONG CURRENT COMMODITY PRICE, FARM INCOME, AND RESOURCE CONSERVATION PROGRAMS

There is no inherent inconsistency between the objective of stabilizing commodity prices to assure adequate farm income, and the objective of reducing excessive erosion on agricultural land to levels that maintain the long-term productivity of soil resources and improve water quality.

The current programs designed to achieve them, however, are not coordinated and have a tendency to work at cross-purposes. The principal mechanism inducing inconsistencies is the positive effect of Federal commodity, loan, and crop insurance programs on the relative economic attractiveness of crops covered by these programs. This, in turn, may induce production patterns that are inconsistent with soil conservation and water quality goals.

Three sets of characteristics determine soil loss from or water depletion on a given site: (1) the physical and climatic characteristics; (2) planting and crop management decisions determing what and how crops are cultivated, and (3) investments in durable capital goods that affect soil conservation (such as terraces) or water use (such as irrigation facilities).

Farm policies and programs have no effect on inherent physical and climatic factors. Policies and programs that affect the relative price or relative production risk of alternative crops strongly influence crop management decisions, including the area and location of production for program crops. Policies and programs that increase farm income and credit availability may affect the extent to which long-term conservation and irrigation investments are made.

Price supports, target prices, nonrecourse loans, acreage reduction programs, subsidized crop insurance, disaster payments, Farmers Home Administration (FmHA) emergency loans, and current export policies all have one thing in common: each increases the economic attractiveness of covered commodities relative to commodities not covered by the program or considered by the policy.

Land set-aside and deficiency payments provide direct income benefits to farmers participating in commodity-specific acreage reduction or other price support programs. Because these programs maintain or increase the market prices of the commodities to which they apply, nonparticipating farmers also benefit, albeit indirectly, through the programs' price-enhancement effects, because they can plant full acreage without restriction and still reap the benefits of high and stable prices. The expectation of high, stable prices may encourage widespread production of price-supported commodities by program participants and nonparticipants alike.

Subsidized crop insurance, disaster payments, and FmHA loan availability help participating farmers by reducing the probability of financial disaster during bad crop years or under poor cropping conditions. These programs, too, make production of program crops more attractive relative to commodities without similar risk-reducing advantages. Such programs also allow crops to be produced in locations that might otherwise be considered too risky. If an individual farmer has choices in deciding what, where, and how much of various commodities to produce, direct and indirect program benefits will naturally be taken into consideration when making planting and crop management decisions. The sum of individual farmers' planting and crop management decisions, as influenced by farm program incentives, subsequently affects soil-erosion and water-use rates. Two implications of this relationship for resource conservation are:

- program crops generally are more erosive than commodities receiving less support (table 5), and
- the availability of farm program benefits encourages cultivation of marginal lands subject to soil erosion and water shortages.

Farmers engaging in production of cotton, corn, grain sorghum, wheat, small grains, and rice are eligible to receive deficiency, diversion, or disaster payments when enrolled in available commodity programs. All of these activities, plus soybean production, also are eligible for subsidies through nonrecourse loans and Federal all-risk crop insurance. With the exception of dairy farmers, producers engaged in activities involving grassland, hayland, range and pasture, and forest and tree-crop land uses are not eligible for commodity program benefits. Because program crops are relatively more erosive than nonsupported production activities (table 5), increased soil erosion may unintentionally result from farmers' response to farm program incentives.

Land that has thin layers of topsoil or is otherwise marginally suited for cultivation generally has lower value and requires higher input costs to be effectively utilized for crop production. Land of this type also is associated with higher rates of soil erosion. Likewise, land that is located in areas subject to drought (such as the Great Plains) carries relatively high production risk. It also is subject to periodic wind erosion and water shortage hazards. Subsidized production and emergency loans to farmers, subsidized crop insurance, and disaster payments, by providing the economic means for recovery from poor cropping conditions, may encourage production on land relatively more subject to high rates of soil erosion or groundwater use.

The basic, conceptual incompatibility of the production of program crops with soil and water conservation is aggravated by current commodity and conservation program provisions and administration. Specifically:

Table 5--Agricultural land uses, erosion potential, and eligibility for major direct farm program benefits

Relative erosiveness 1/	Land use or production activity 2/	Eligibility to receive--		
		Deficiency, diversion, and disaster payments	Nonrecourse loans	Federal all-risk crop insurance 3/
1	Cotton	X	X	X
1	Soybeans		X	X
2	Corn	X	X	X
2	Grain sorghum	X	X	X
3	Wheat	X	X	X
3	Barley	X	X	X
3	Oats	X	X	X
3	Rice	X	X	X
4	Grassland			
4	Hayland			
4	Range and pasture			
4	Forest and tree crops			4/

1/ 1 = most erosive, 2 = moderately erosive, 3 = less erosive, 4 = least erosive.
2/ Specialty and miscellaneous crop production is not included since the relative erosiveness of crops in those categories can range from high (for example, tobacco) to low (for example, vineyards).
3/ FCIC all-risk crop insurance is available in locations where disaster payments are not made in conjunction with commodity programs.
4/ FCIC all-risk crop insurance is available for some forage and seed enterprises and tree fruit producers in a few U.S. counties only.

- The direct and indirect income benefits of producing commodity program crops are available to farmers regardless of the soil erosion on their land.

- Current commodity program provisions discourage long-term conservation uses of land by denying base-acreage status to land not recently used to produce program crops.

- USDA soil and water conservation cost-share and technical assistance programs, while generally targeted towards regions that typically experience resource problems, are not targeted towards those cropping systems most likely to induce high rates of erosion and water-supply degradation.

- The voluntary nature of soil and water conservation programs favors implementation of conservation practices for productivity gains rather than for reduction of off-farm consequences of erosion and water depletion.

Some commodity program participants who have erosion problems apply conservation measures to reduce soil erosion to acceptable levels. Others, however, till erodible soils without conservation measures. Since commodity programs are not linked with resource problems, the latter group enjoys program benefits at the same time that it contributes to soil erosion problems. This group's participation in commodity programs helps achieve commodity price objectives but adversely affects achievement of conservation goals.

Land set-aside features of supply control programs require participants to maintain a "normal crop acreage" base. The base is used to calculate set-aside payments when a paid land diversion option is implemented. Basically, the larger the base, the greater a participant's potential payments. Grassland that has not been cultivated within 3 years cannot be counted as part of this base. Thus, some farmers who practice longrun soil conservation strategies may not be eligible for certain commodity program benefits. This feature of current commodity programs may encourage continuous cultivation of some land areas.

While in recent years both SCS and ACP funds have been better targeted towards those areas that have the most severe resource problems, funds within these areas still are not allocated on the basis of severity of individual applicants' soil or water conservation problems. Selection criteria are not tied to cropping systems which help maintain land productivity or measures of erosion or water quality.

Public clamor for improved soil and water conservation at this time focuses more on environmental than productivity issues. Evidence suggests that the costs of off-farm erosion damage are much higher than the costs of lost productivity (4). If program participants are active in conservation primarily for productivity benefits, the major, off-farm benefits may not be accruing to the extent possible.

The extent to which participants in USDA programs contribute to the Nation's soil erosion problems must be known before the success of various options for increasing program consistency or policy goal achievement can be judged. Accordingly, USDA collected information linking soil erosion rates with farm operators' USDA program participation histories for a sample of cropland points in critical soil erosion areas.

The USDA study examined eight areas of the country in which critical cropland erosion problems are concentrated (fig. 1). For each of a random sample of 2,882 NRI points from 68 counties within these study areas, SCS data on the sum of sheet and rill erosion plus wind erosion estimated for 1982 were compared with ASCS and SCS data on USDA program participation and other characteristics of operators of the land on which the samples fell. Program participation information included the history of operators' participation in Federal conservation programs administered by ASCS and SCS, as well as their enrollment in commodity programs.

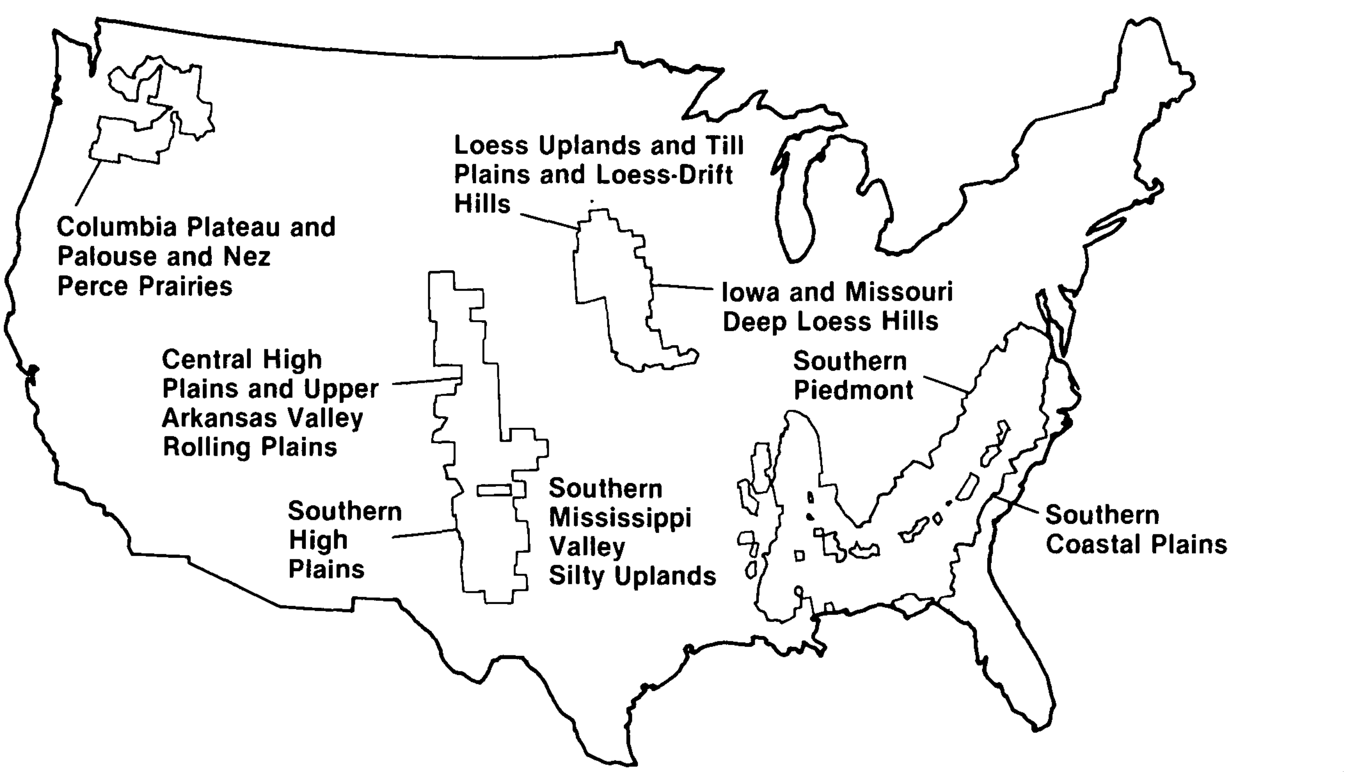
More than half the sampled cropland points in the critical erosion study areas eroded more than 5 tons per acre per year, the rate considered tolerable on average, to maintain the longrun productivity of most U.S. soils (table 6). By contrast, only about 34 percent of total U.S. cropland erodes above the 5 tons per acre per year.

In the study areas, 62 percent of the 1982 cropland eroding above 5 tons per acre per year was operated by individuals participating either in commodity or USDA conservation cost-share or technical assistance programs in that same year (table 6). The other 38 percent of the operators of land eroding above 5 tons per acre per year were neither commodity nor conservation cost-share nor technical assistance program participants.

The common, overriding characteristic of highly eroding land in the eight areas was that the land was most frequently on farms producing food grains, feed grains, or cotton--the major commodity program crops. High erosion rates commonly occurred on land operated by young farmers (under 40 years of age). High erosion in the study areas also occurred more frequently on land of

Figure 1

Location of Study Areas Covered by USDA Program Consistency Study Data Assembly



operators whose primary source of operating loans was FmHA or a Production Credit Association, as opposed to those who borrowed from commercial sources. Land operated by short-term tenants in the study areas was more likely to be eroding at high rates than that of owner-operators or tenants with long-term leases.

Commodity and conservation program participation in the study areas was distributed fairly evenly between land eroding above and below 5 tons per acre per year. Concurrent participation of commodity program participants in conservation programs was slightly lower on land eroding above 5 tons per acre per year (table 6).

About 45 percent of the sampled cropland was operated by commodity program participants (some of whom also participated in conservation programs). Of this land, 58 percent was eroding above the tolerable level. However, 42 percent of commodity program participants maintained tolerable rates of soil loss, even though a majority of these operators did not participate in conservation cost-share or technical assistance programs (table 6).

Compared with national averages, the critical erosion areas studied contained higher proportions of land eroding above tolerance levels, acres in commodity programs, and funds available for Federal conservation programs. Recognizing this bias and adjusting for year-to-year program variation, the following deductions may be made 1/:

1/ The estimates presented here differ from preliminary estimates published in (14), because updated data on 1982 commodity program participation were used to derive final deductive estimates.

Table 6--Participation by farmland operators in USDA commodity and conservation programs, by soil erosion levels in eight critical erosion areas, 1982

1982 program participation	Land eroding below: 5 tons/acre/year	Land eroding above: 5 tons/acre/year	Total, all cropland sampled
	Percentage of all operators in areas sampled		
Commodity program only	11.6	16.2	27.8
Both commodity and conservation programs	8.0	9.0	17.0
Conservation programs only	7.1	7.0	14.1
Neither type of program	19.0	22.1	41.1
Total	45.7	54.3	100.0
	Percentage of operators in erosion category		
Commodity program only	25	28	
Both commodity and conservation programs	17	18	
Conservation programs only	16	16	
Neither type of program	42	38	
Total	100	100	

- o Within any given year, roughly 40 to 65 million acres of U.S. cropland eroding above 5 tons per acre per year are operated by participants in USDA commodity and/or conservation cost-share or technical assistance programs.

- o Individuals participating in neither commodity nor USDA conservation cost-share nor technical assistance programs operate between 75 and 110 million acres of cropland eroding at rates greater than 5 tons per acre per year.

- o Roughly 65 to 105 million acres of U.S. cropland are operated by USDA program participants and erode at rates below 5 tons per acre per year.

- o Between 150 and 230 million acres of U.S. cropland erode at rates below 5 tons per acre per year and are operated by individuals participating in neither commodity nor USDA conservation cost-share nor technical assistance programs.

It appears that, in a given year, between one-half and three-fourths of cropland eroding above the 5-ton-per-acre-per-year level is operated by individuals who are not participating in commodity or USDA conservation cost-share or technical assistance programs. These farmers would not be directly influenced by changes in conservation or commodity programs designed to reduce erosion or increase program consistency. The remaining one-fourth to one-half of the erosion problem, in terms of acreage with erosion exceeding 5 tons per acre per year might, however, be addressed through modifications in USDA's commodity or conservation programs. The extent to which operators of this problem acreage might be influenced by program changes is not clear.

There are two distinctly different types of cropland erosion problems: (1) the problem of poorly managed land on which erosion could, with proper crop choice and conservation practices, be maintained at tolerable levels, and (2) the problem arising from cultivation of inherently erodible land (2). The groups of farmers contributing to erosion problems in each of these two ways may react differently to given commodity or conservation program changes. Each group responds to various economic incentives.

Many things other than farm programs affect farmers' behavior. Federal programs outside USDA, such as tax provisions, influence farmers' choices regarding type and intensity of operation. General economic conditions strongly affect farmers' decisions. Research in the Palouse region of the Pacific Northwest indicates that while deficiency payments and set-aside programs have strengthened disincentives to conserve soil, it is basically the strong relative prices of grains relative to livestock that create the incentive to intensively cultivate land. Farming erodible land in that area still would offer profit advantages in the absence of the opportunity to participate in farm programs (7). Similar results are suggested in recent studies of the grassland plowout phenomenon in Montana and Colorado. The decision to cultivate rather than to conserve erodible land, while supplemented by the availability of farm program benefits, is driven by relative commodity prices and land values (8, 21).

FUTURE DIRECTION OF RESOURCE POLICY

Various interest groups are advancing new policy options to achieve increased soil and water conservation. Some options are designed to improve current conservation policies while others are meant to accomplish both farm commodity and conservation program objectives. In this section a few of the more prevalent proposals will be highlighted and their consequences summarized.

First, expanded targeting of conservation spending within the context of current conservation programs would improve program cost-effectiveness. SCS and ASCS efforts to target cost-sharing funds and conservation technical assistance have increased program efficiency. For example, the average cost per ton of sheet and rill erosion reduction under ACP declined from $2.22 during the 1975-78 period to $2.05 in 1983 (19). Soil and water conservation efforts are significantly greater in targeted than in nontargeted areas. Also, the cost-effectiveness of given conservation practices is higher in the targeted areas. More improvement in program effectiveness would be possible if more restrictive criteria were used in targeting. There is wide variability in erosion rates within even the most erosion-prone areas. Improved targeting could focus on reduced usage of production practices that present the greatest erosion hazards. Individual farm types and locations of erosion hazards could be targeted not just to areas, but within them. However, more intensive targeting could increase program administrative costs.

Developments that should permit improved targeting include the information advances made through the recent NRI inventory and modeling activities such as EPIC. Critical erosion can now be identified, and the net value of the productivity loss associated with soil erosion can now be estimated. These developments could permit SCS and ASCS to implement a productivity-based targeting scheme for the Nation's cropland to achieve greater program effectiveness and efficiency. However, targeting does nothing to insure consistency with other USDA programs. If targeting schemes were to focus on crop production systems, the efficiency of conservation programs would be increased. But the farmers receiving the largest share of targeted funds to maintain cropland productivity are more likely to be receiving commodity program incentives to produce.

Second, to reduce the inconsistencies between conservation and other USDA programs, cross-compliance initiatives, such as the "sodbuster" provision, have been proposed. Such provisions may require a farmer to implement a conservation plan for the farm as a requirement for commodity or credit program participation or may disallow commodity program participation for cropland or whole farms if certain erodible soils are cultivated. These proposals could lead to greater consistency between programs, but may also have some less desirable impacts. They may prevent programs from achieving their participation objectives. For example, farmers on erodible cropland who wish to participate in commodity programs will incur more substantial conservation costs. The costs of commodity program participation may exceed the potential benefits unless substantial increases in cost-sharing funds are made available. Also, the consistency study described in the previous section indicated that a significant share of farmers do not participate in commodity programs. Linking conservation assistance to commodity programs could ignore a large population of farmers whose land or production practices contribute to aggregate soil erosion or water depletion problems. Nonparticipants also benefit from supported commodity prices, which provide incentives to all producers to expand irrigation (6) and plowout rangelands to grow program crops.

Third, an integrated conservation and commodity program approach is being advocated by various groups (1). The approach uses long-term retirement of erodible cropland both to reduce soil erosion and enhance commodity price levels. As Ogg, Webb, and Huang (12) discuss, a number of potential options are available in designing such a program. Three conservation reserve options were studied, each compared to a base solution which limited crop production below 1982 levels in various regions of the country. Crop prices were set equal to their respective 1985 target price. The results tended to indicate that the least productive cropland could be retired to achieve the commodity price objectives, but unfortunately, the erosion control impacts would be limited because the most erodible cropland is not necessarily the least productive. Another option would be to retire the most erodible cropland. While the reduction in erosion would be substantial, the reduction in surplus productive capacity might not be sufficient to accomplish commodity price goals within current budget constraints.

If land retirement is targeted to highly erodible cropland removed from production on a competitive-bid basis, it may be possible to satisfy farm income objectives and make a significant contribution toward conservation goals. Such a program could retire over 20 million highly erodible acres, cost approximately $1 billion, reduce soil erosion about 20 percent, and achieve commodity price objectives. The least-cost retirement option would reduce program costs over 10 percent but would only reduce soil erosion by about 12 percent and accomplish the same commodity price objectives. If the 20 million most erodible acres of cropland were retired into a conservation reserve, program costs would be over 35 percent above the targeted option but total soil erosion would decline over 30 percent. Also, the commodity price objectives would not be achieved, even though significant price adjustments would occur. The long-term land retirement approach could be extended to conserve scarce groundwater supplies in the Ogallala Region and similar drawdown areas.

While an integrated approach may offer one means for realizing consistent, effective, and efficient farm commodity and conservation programs, markets and market signals in soil and water use decisions may also be helpful in guiding future program decisions. For example, past farm commodity programs have artificially constrained the land input, raised its relative price, and induced the development of land-saving technologies. In turn, these relative price distortions alter the profit-maximizing combinations of production inputs as well as the bias of technological development. If such distortions are removed, market prices for soil and water resources can be used as signals of resource scarcity, indicators of profitable input substitution opportunities, and inducements for technological change. From such information the need for and role of conservation programs in allocating soil and water resources over time might be ascertained.

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