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Soil & Water Conservation

Background for 1985 Farm Legislation

- Soil erosion: historical setting and the role of USDA
- Soil & water resources: status, condition and trends
- Existing USDA conservation programs
- State & local conservation programs
- Ties between USDA commodity and conservation programs

Foreword

In 1985 Congress will consider new farm legislation to replace the expiring Agriculture and Food Act of 1981. In preparation, the Department of Agriculture and many groups throughout the Nation are studying many of the programs and policies established in the 1981 Act or earlier as well as many other trends and issues. This report gives a comprehensive view of the questions concerning soil and water conservation that must be answered in developing agricultural policy for the future. Background papers on various commodity issues are available from the Economic Research Service. For more information see the suggested readings listed at the end of this report.

This report was prepared by David Russell and Dennie G. Burns, with assistance from James De Quattro, Soil Conservation Service.

Abstract

This report outlines the role of the U.S. Department of Agriculture (USDA) in conservation programs from their beginning in the early 1930's to the 98th Congress in 1984. To indicate the dimensions of present-day soil and water conservation problems, the report summarizes USDA inventory data on the status, condition, and trends of our soil and water resources. Major USDA conservation programs that address these problems today are described. The 1981 Agriculture and Food Act contains several provisions affecting resource conservation; this report summarizes those provisions. In 1982 USDA developed a National Conservation Program based on extensive inventories, analyses, and public participation. That program currently guides USDA conservation efforts on the Nation's nonfederal lands. State and local government and the private sector play an increasing role in the planning of conservation programs and the installation of conservation measures. One difficult issue facing the Nation in developing a consistent and coherent agricultural policy is the sometimes conflicting objectives of commodity and conservation programs. This report provides background information to further dialogue and action on this issue.

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Soil & Water Conservation: Background for 1985 Farm Legislation

In 1985, when the 1981 Agriculture and Food Act expires, Congress will consider new legislation to guide the Nation's farm programs for the next several years. Soil and water conservation may play a greater part in farm-bill discussions this year than in any year since 1935, when Congress first established a major Federal role in conservation.

There are many reasons for this year's legislative focus on conservation, but four stand out: (1) a historic level of concern about erosion and other conservation problems, (2) widespread hardship in the agricultural sector, (3) inconsistencies and inefficiencies in conservation and commodity programs, and (4) huge agricultural surpluses. In addition, the massive Federal budget deficit is affecting consideration of nearly all Federal expenditures.

In the past few years, the United States Department of Agriculture (USDA) has led an examination of conservation needs and programs that is unprecedented in USDA's history. In 1982 USDA developed the National Conservation Program on the basis of findings from many studies by the Department, other Federal agencies, state governments, and concerned organizations in the private sector. In developing the program, USDA incorporated the results of an extensive process of public participation. The expiring Agriculture and Food Act of 1981 contains several provisions affecting resource conservation, but major questions remain, including:

- How can the loss of soil productivity from erosion and other soil-related factors be halted or at least slowed?
- How can highly erodible land best be removed from cropland use or kept in less intensive uses more suited to the land's capabilities?
- How can USDA's conservation and commodity programs more effectively reach their goals?
- What forms of Federal support to states and local governments would be most cost-effective in increasing their participation in and support of conservation efforts?
- What forms of Federal assistance to farmers and ranchers might yield the most conservation benefits for the least cost to the taxpayer?

This report provides background information on these and other questions that must be answered if farm policies are to be coherent, consistent, economical, and effective.

Erosion: Historical Setting and the Role of USDA

When Europeans first settled in North America, labor was scarce and expensive; land was plentiful and cheap. Farming was extensive rather than intensive. When soil became eroded or its nutrients depleted, the farmer let the land lie fallow for several years or abandoned it and moved west to new land. The cost of conserving and fertilizing the soil would likely have exceeded the value of improved yields.

By the time of the American Revolution, colonists had settled a 100-mile-wide strip of land from southern Maine to Georgia, and one-half to three-quarters of the land was cleared. In the North, 5 to 15 percent of the land was tilled each year; in the South, 40 to 50 percent was tilled. Continuous tilling eventually damaged the soil. Crop yields declined and erosion increased on sloping fields. Forest lands were cleared, cropped, and then abandoned. Cheap, abundant land allowed the farm-out-and-move-on philosophy to become entrenched.

Even though colonial farmers did not regard soil conservation as an immediate need, some reformers argued that it was necessary for the future. Thomas Jefferson, for example, advocated crop rotations, clover plantings, and contour plowing.

Few adopted such conservation efforts. Land was so plentiful and labor so scarce that conservation made little economic sense. Edmund Ruffin's soil-chemistry experiments in the 1840's on his Virginia farm were dubbed Ruffin's Folly by his neighbors. Perched on the edge of a rich and underused continent, most farmers considered soil conservation foolish. They had no reason to believe that a soil's productivity could be exhausted.

Westward expansion

Through the nineteenth century, conservation was all but ignored amid the westward expansion, the Civil War, and its aftermath. After the war, pressures for debt repayment led farmers to increase production. Better transportation, new farm machinery, the end of the Indian wars, and rapidly growing markets gave rise to a boom psychology. But production outpaced demand and the result was both low prices for farm products and soil exploitation. Farmers continued to "farm out and move on."

As settlers moved into the West, where rainfall was lower and less dependable, drought became the great threat and irrigation the great hope. Along with homestead lands, the Federal Government and other landholders sold or gave away vast acreages in the West after the Civil War. The largest private landholders, the railroads, had 125 million acres to sell, which had been granted to them in checkerboard fashion along the rail right-of-way as the incentive to build west. Land was also granted to colleges, through the Land Grant College Act of 1862, and to war veterans. In 1877 Congress passed the Desert Land Act, which increased the homesteading unit to 640 acres and required irrigation on a portion of it.

Homestead farms in western areas were often disastrous. Traditional tillage damaged the soils. Many homesteads failed and were abandoned or consolidated into larger farms.

The beginnings of national conservation policies

In 1891 Congress set aside the first forest preserves. This set-aside marked the first reversal of the Federal policy of disposing of public lands and encouraging settlers to move west. Although homesteading continued, the 1916 Stock-Raising Homestead Act and other statutes limited homesteading or withdrew certain public lands from private ownership. With the turn of the century came the beginning of the public land management policies that now control the Federal domain, one-third of the Nation's land. It also marked the start of significant conservation awareness in this country. An era was ending--the era of moving to new lands to escape the consequences of poor farming practices.

The active role of the Department of Agriculture in erosion control began in 1894, when one of the Department's first information bulletins for farmers pointed out that thousands of acres of valuable but eroded cropland were abandoned each year. The bulletin urged farmers to conserve the land they had.

Despite the advice of this and other bulletins, however, farm exploitation and abandonment continued for many years more, and USDA's conservation efforts did not gain much public attention until the 1920's. This occurred largely through the efforts of one man, Hugh Hammond Bennett. While mapping soil types for USDA's Bureau of Chemistry and Soils, Bennett observed example after example of soil erosion throughout the country. He lectured extensively about erosion, and in 1928 he and W.R. Chapline of the U.S. Forest Service wrote "Soil Erosion: A National Menace."

A national menace

At the time Bennett began work as a soil scientist with USDA, many scientists held that soil damage and lack of fertility were caused mainly by chemical processes in plant growth. They considered erosion a minor issue. Bennett, however, through his experience as a soil surveyor, saw the damage caused by sheet erosion as well as gullying.

At first it was not easy to convince Congress of the importance of a Federal role in preventing soil erosion. Many lawmakers believed that landowners would conserve without public assistance once they understood the costs of erosion and the long-term benefits of conservation. The first action by Congress, therefore, was to provide funds only for erosion research. In 1930, $160,000 was appropriated and 10 erosion control experiment stations were established. In the 1930 USDA Yearbook, Agriculture Secretary Arthur Hyde stated, "That soil erosion is a national menace, is now recognized. The appropriation by Congress...is evidence of this recognition."

More comprehensive soil conservation legislation followed during the Great Depression and severe droughts of the 1930's.

The Great Depression put nearly one-quarter of the labor force out of work at a time when there were no public welfare programs, unemployment insurance, food stamps, or Social Security. Nearly one-fourth of America's people lived on the nation's 6 million farms. Faced with high debts and low prices, farmers and their families could not afford the long-term investments that soil conservation entailed.

In the middle of this decade of economic disaster, the Soil Erosion Service was created as a temporary bureau within the Department of the Interior. In 1933 Congress funded President Roosevelt's request for $5 million for soil conservation projects to combat erosion and increase employment. The Service used these funds to construct demonstration projects illustrating good conservation practices. The Civilian Conservation Corps (CCC) and Works Progress Administration (WPA) provided the labor.

In 1934 severe wind and drought caused dust blizzards throughout the parched, tilled, unprotected wheatlands of Texas, Oklahoma, Colorado, and Nebraska. For three years, reddish-brown Plains topsoil was carried skyward across the continent and over the Atlantic Ocean, where it was still visible hundreds of miles at sea.

The first national conservation program

In April 1935 Congress passed its first major conservation bill. The Soil Conservation and Domestic Allotment Act of 1935, which established the Soil Conservation Service (SCS) within USDA, declared that it was the policy of Congress:

> "...to provide permanently for the control and prevention of soil erosion and, thereby, to preserve natural resources, control floods, prevent impairment of reservoirs, and maintain the navigability of rivers and harbors, protect public health, public land, and relieve unemployment...."

Through a permanent national program, the Soil Conservation Service was to provide direct technical assistance to farmers to control erosion. Thus began a shift away from research and demonstration projects. Demonstration projects would be too costly as the principal means of reaching all the Nation's farmers and persuading them to apply the demonstrated measures. This prohibitive cost and the need to increase farmer participation in conservation programs prompted the Secretary of Agriculture's decision to emphasize direct technical assistance to individual land users.

The Soil Conservation Act of 1935 also provided government payments as cost sharing for adoption of conservation practices primarily to reduce acreages of soil-depleting crops. The early focus of cost-sharing was on supplying lime, fertilizer, and other materials for restoring productivity. Later the emphasis of cost-sharing payments shifted to agronomic and structural measures to control erosion. The basic cost-sharing program of USDA today is the Agricultural Conservation Program (ACP) administered by the Agricultural Stabilization and Conservation Service (ASCS).

Conservation districts

In 1937 President Roosevelt submitted to governors of all states a "Standard Soil Conservation Districts Law" to encourage states to facilitate the establishment of soil conservation districts as local units of state government. By 1947 all the states had passed laws by which districts could be formed to promote voluntary application of soil conservation practices.

Soil conservation districts, governed by elected and appointed supervisors, proved to be a practical organization through which local farmers and the

Federal Government could join forces to carry out soil and water conservation. Typically a district was organized to serve a single county, although in many cases one district served more than one county and some large counties had two or more districts. SCS sent experts into the districts to help farmers and district supervisors draw up and implement farm conservation plans. These plans included terracing, stripcropping, drainage, crop rotation, contouring, fertilization, pasture improvement, controlled grazing, and tree plantings. Today there are almost 3,000 conservation districts. They cover nearly every county and nearly all nonfederal land.

A separate system was adopted for local administration of ACP and other cost-sharing programs assigned to ASCS. That system consists of farmer-elected Agricultural Stabilization and Conservation (ASC) committees in each county.

The Soil Bank

During the mid-1950's, farm commodity surpluses were increasing and net farm income was declining. Then as now, opinions differed widely on the appropriate Federal response. Secretary Benson favored reducing the surplus by lowering price supports and allowing market prices to control production; Congress favored a stronger Federal role and creation of a "national granary" to ensure that food supplies would be adequate in case of widespread crop failure. Congress and the Administration compromised and established a program of voluntary land retirement through acreage rental payments to farmers.

The Soil Bank, established by the Agricultural Act of 1956, was intended to adjust supply to demand by taking land out of production. Its secondary purpose was to establish and maintain vegetative cover or other conservation practices such as tree planting, water improvements, and wildlife habitat on the land taken out of production.

The program had two parts: an acreage reserve and a conservation reserve. The acreage reserve was to reduce the amount of land planted to allotment crops (wheat, corn, tobacco, peanuts, and rice). Under its terms, farmers cut the acreage planted to these crops below established allotments or--in the case of corn--their base acreage. They received payments for the diversion of such acreage to conserving uses. In 1957, 21.4 million acres were in the acreage reserve, but Congress ended the program in 1958. During the 3 years of the acreage reserve, rental payments were $1.57 billion.

In the conservation reserve, the participating farmer signed a 3- to 10-year contract to withdraw cropland from production, comply with acreage allotments, reduce total cropped acreage by the amount placed in the reserve, and maintain approved conservation cover on the reserve land. For maintaining cover, the farmer could receive conservation cost sharing and technical assistance in addition to annual rental payments to compensate for the loss of income from the reserve acreage. At the peak of the program in 1960, 28.7 million acres on 306,000 farms were under contract, but no new contracts were written after 1962. The last contract expired in 1972. Under the conservation reserve, annual rental obligations through 1969 were $2.48 billion.

This attempt to link conservation and agricultural adjustment in a single program was moderately successful, but widespread opposition led to the program's end. Agricultural suppliers and community leaders complained that

whole farms had been retired, so that farmers no longer purchased farm supplies and some moved away. Many people were philosophically opposed to paying farmers for not producing. Another criticism was that the program, while expensive, had little effect on production, since Soil Bank farmers would farm more intensively on fields not in the Soil Bank.

The 1970's: Boom and bust

The export market of the 1970's brought new concerns over conservation. During the 1970's a weak U.S. dollar caused by accelerating inflation helped expand an already healthy world demand for U.S. agricultural products. Grain exports increased dramatically in 1973, when the Soviet Union began buying large quantities of American grain. Agricultural surpluses all but disappeared. From 1967 to 1977, farmers plowed more land to take advantage of rising prices. More than 2 million acres of marginally productive lands were converted to cultivated cropland, at some cost to conservation progress. The net increase in harvested cropland was 24 million acres from 1973 to 1974. By 1981, harvested cropland reached 391 million acres, up from less than 335 million acres in 1972.

Meanwhile, studies of USDA conservation programs concluded that the need for protecting soil resources had increased. For example, the General Accounting Office (GAO) concluded in 1977 that, on 84 percent of the farms sampled, annual soil losses were above levels thought to be allowable for sustained productivity. GAO also concluded that many USDA conservation efforts were not focused on areas with serious conservation problems.

As dramatically as exports boomed and surpluses shrank in the mid-1970's, these trends quickly reversed in the late 1970's and early 1980's. Agriculture had become far more dependent on the fluctuations of foreign markets, while domestic demand remained stable. Energy and credit costs skyrocketed amid rapid rises in inflation. Foreign demand fell, domestic surpluses increased--and so did the cost of maintaining commodity support prices above open-market levels.

One encouraging development of the 1970's promised to benefit both conservation and farm economics. This development was the spectacular increase in the use of conservation tillage systems. Conservation tillage is any farming method that maintains plant cover or crop residue on the land. Conservation tillage can reduce erosion, increase water infiltration, reduce evaporation, and provide other soil and crop benefits. It can also reduce the farmer's fuel, equipment, and labor needs.

Conservation tillage is being adopted faster than any other practice in farming history. From 1972 to 1982, farmers more than tripled the acreage on which they used conservation tillage--from 30 million to nearly 100 million acres. In 1983 farmers used conservation tillage on one-third of the acres planted to crops.

A new look at resources and policies

In 1977 the Congress passed legislation requiring USDA to set up a formal process to evaluate soil conservation goals and methods. The 1977 Soil and Water Resources Conservation Act (RCA) required USDA to (1) appraise on a

continuing basis the soil, water, and related resources on nonfederal land; (2) develop programs for furthering conservation, protection, and enhancement of these resources; and (3) annually evaluate program performance.

The RCA, the 1977 National Resources Inventory, and the National Agricultural Lands Study helped produce a greatly increased awareness of resource problems by government and the general public.

By 1981 three facts were clear: commodity price supports had become more expensive and less effective, USDA conservation programs were not adequately focused on areas where resource problems were critical, and commodity and conservation programs often worked at cross-purposes. In considering national farm legislation in 1981, Congress was concerned with the cost and effectiveness of both types of programs.

The Agriculture and Food Act of 1981 enacted by the 97th Congress included a variety of conservation-related provisions (see page 25). In the 98th Congress, members introduced a number of bills that addressed conservation topics. Two were especially notable. The first, the "sodbuster" bill, was introduced by Colorado Senator William Armstrong. It proposed denying farm-program benefits to producers who raise crops on highly erodible soils. The bill had wide support in the Senate. The House passed a similar version, but the sodbuster idea died in conference because of House-Senate disagreement over the second notable conservation bill of the 98th Congress, the "conservation reserve."

Introduced by Tennessee Representative Ed Jones, the conservation-reserve bill would have authorized $225 million over a 3-year period to pay farmers who agreed to retire erodible land from crop production. The House passed the bill as an additional title in its version of the sodbuster bill, but Senate conferees and the Administration opposed taking up the proposal in advance of the 1985 farm bill.

The prominence of the sodbuster and conservation-reserve bills in the 98th Congress means that both will likely be reintroduced in the 99th Congress as proposed components of the 1985 farm bill.

Soil & Water Resources: Status, Condition, and Trends

In March 1981 USDA published a detailed appraisal of the Nation's soil and water resources in response to the Resources Conservation Act (RCA) of 1977. The appraisal drew heavily on the 1977 National Resources Inventory (NRI) conducted by the Soil Conservation Service and from the Second National Water Assessment prepared by the Water Resources Council. This body of data has been updated by the 1982 NRI, on which most of the information in the following sections is based.

Land use

Excluding Alaska, the land mass of the United States covers about 1.9 billion acres. Of this acreage, the Federal Government administers 400 million acres

in parks, forests, wildlife refuges, grasslands, and other public land. The remaining 1.5 billion acres include privately owned rural land, urban and built-up land, Indian land, and land owned by state and local governments. Nonfederal land in 1982 was used as follows:

Use of nonfederal land	Million acres	(%)
Rural	1,414	94
Cropland	421	28
Pastureland	133	9
Rangeland	406	27
Forest land	394	26
Other uses	60	4
Rural transportation	27	2
Urban and built-up	47	3
Water	10	1
TOTAL	1,498	100

Land capability

Under a system devised by the Soil Conservation Service, U.S. soils are grouped into eight land capability classes. Soils in classes I through III are generally suited for frequent cultivation, soils in class IV have severe limitations for cultivated uses, and classes V through VIII are generally unsuited for cultivation.

Capability classification also designates limiting physical attributes of the soils: "e" for high erosion hazard; "s" for shallow or stony topsoil (root zone limitation); "w" for excess moisture content, flooding, and drainage problems; and "c" for climatic (cold or dry) limitations. For example, class IIw lands have moderate to high suitability for cropland but retain excessive moisture.

More than half of the Northern Plains, Corn Belt, and Lake and Delta States is in classes I, II, and III. In contrast, more than half of each other region is in classes IV to VIII. Table 1 shows how the classes are distributed by region.

Productivity and soil erosion

Erosion is the major soil-related factor that affects long-term productivity of the Nation's soils. Loss of productivity due to erosion is a serious problem in many areas. With new analytical tools, researchers and analysts are measuring with greater precision the effect of erosion on productivity. Their findings will have implications for conservation work by individual land users and for conservation programs at all levels of government.

What is soil erosion? Soil erosion is a natural process. Erosion on land covered by vegetation is probably no more than 1 inch every 100 years, and much of this loss is offset by the formation of new soil. On bare cropland, however, wind and water erosion can be visible and can gradually destroy productivity.

Water-induced erosion is of three types: sheet, rill, and gully. Sheet erosion removes imperceptively thin layers of soil. Loss of just one-eighth

Table 1.--Capability classes by crop production region

Crop production region	Percentage of land in class-- I-III	IV	V-VIII
Corn Belt (Ill., Ind., Iowa, Mo., Ohio)	76	9	15
Lake States (Mich., Minn., Wis.)	57	14	29
Northern Plains (Kans., Nebr., N. Dak., S. Dak.)	57	12	31
Delta States (Ark., La., Miss.)	56	12	32
Southeast (Ala., Fla., Ga., S.C.)	48	21	31
Southern Plains (Okla., Tex.)	45	13	42
Appalachian (Ky., N.C., Tenn., Va., W. Va.)	40	12	48
Northeast (Conn., Del., Md., Me., Mass., N.H., N.J., N.Y., Pa., R.I., Vt.)	38	11	51
Pacific (Calif., Ore., Wash.)	25	16	59
Mountain (Ariz., Colo., Idaho, Mont., Nev., N. Mex., Wyo., Utah)	17	13	70

of an inch in a year translates to more than 20 tons per acre--a high rate of erosion. Rill erosion occurs when water from rain or melting snow creates small channels. As the runoff on a field increases in velocity, more and deeper rills form and they carry more soil. Average annual sheet and rill erosion is at least 20 tons per acre on 15.5 million acres of cropland.

Gully erosion is a severe form of rill erosion. Thanks to conservation practices, severely gullied land is less common today. But gullying continues to be a problem on cropland in many prime agricultural areas, such as west Tennessee and the Palouse hills of the Pacific Northwest.

Wind erosion can be extreme where plowed fields are unprotected by ground cover, where rainfall is inadequate, and where soil is no longer held by plant roots. For example, in Lincoln County, Colorado, farmers recently plowed up grassland in order to plant wheat, although this land is better suited to grassland used for livestock grazing. As a result, severe dust storms have occurred. The Texas High Plains is another arid area where wind erosion goes hand in hand with large-scale crop production, in this case cotton. Wind erosion in cotton-producing counties of west Texas can be as high as 50 tons per acre per year.

Erosion rates in 1982. Based on 1982 NRI data, USDA has concluded that soil erosion affected fewer acres and conservation practices protected more acres in 1982 than in 1977. In 1977 there was about 1.93 billion tons of sheet and rill erosion on 413 million acres of cropland. In 1982, although total cropland increased to 421 million acres, sheet and rill erosion decreased to

1.8 billion tons. Therefore, average annual sheet and rill erosion on all cropland decreased from 4.7 tons per acre in 1977 to 4.3 tons per acre in 1982. Including wind erosion, average annual erosion for all cropland in 1982 was 7.3 tons per acre. Figure 1 shows cropland erosion for the contiguous 48 states.

On a state basis, the average annual loss of soil on croplands from water erosion has been highest in Tennessee, Hawaii, Missouri, Mississippi, and Iowa. Wind erosion losses have been most significant in Texas, New Mexico, and Colorado.

Part of the 1982 NRI data is a measurement of the acreage eroding at rates above "soil loss tolerance" (T). The T value refers to the maximum annual soil loss that will permit a high level of production economically and indefinitely. Tolerance values range from 0 to 5 tons per acre depending on the soil type. Most deep, rich cropland soils have a T value of 5; thin rangeland soils commonly have a T value of 1. On the basis of the 1982 NRI, average annual sheet and rill erosion for various land uses is related to T value as shown in table 2.

Where is the worst erosion? In many regions, severe water-erosion problems continue; for example--

- o West-central Idaho, eastern Washington, and north-central Oregon.
- o Loess (wind-deposited) soils of Nebraska, Kansas, Iowa, and Missouri.
- o Silty uplands of the southern Mississippi Valley (including portions of Tennessee, Kentucky, Mississippi, Louisiana, and Arkansas).

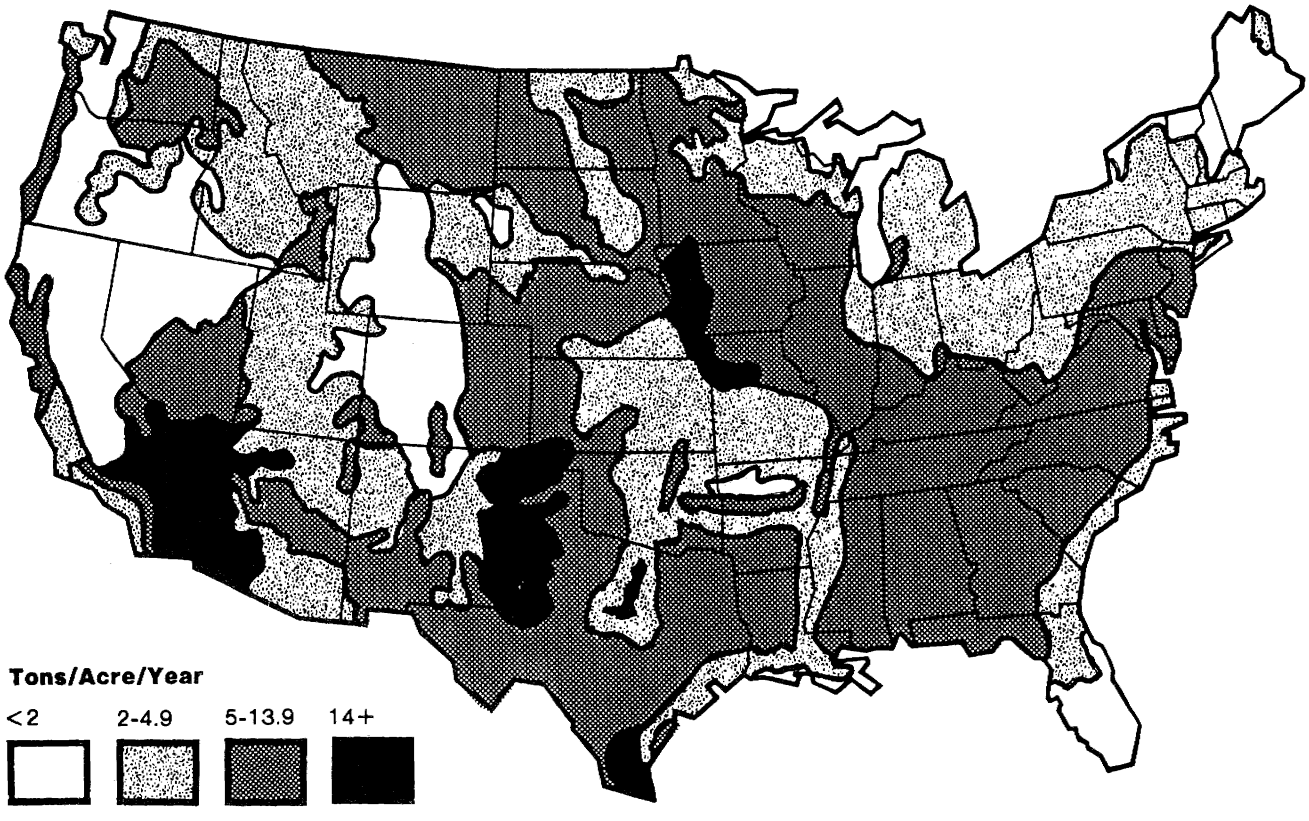

Figure 1.--Average annual sheet, rill, and wind erosion on cropland (1982 NRI).

Table 2.--Sheet and rill erosion by major land use, 1982 NRI

Land use	Total	Categories of average annual sheet and rill erosion					
		≤T	%	T-2T	%	>2T	%
Cropland:							
Area (million acres)	421.4	315.6	75	54.9	13	50.9	12
Erosion (million tons)	1,843.4	506.8	27	328.8	18	1,007.8	55
Erosion rate (tons/acre)	4.4	1.6	--	6.0	--	19.8	--
Pastureland:							
Area (million acres)	133.3	122.0	92	5.5	4	5.8	4
Erosion (million tons)	180.1	59.8	33	26.3	15	94.0	52
Erosion rate (tons/acre)	1.4	0.5	--	4.8	--	16.2	--
Rangeland:							
Area (million acres)	405.9	355.2	88	21.8	5	28.9	7
Erosion (million tons)	561.7	182.9	33	63.4	11	315.4	56
Erosion rate (tons/acre)	1.4	0.5	--	2.9	--	10.9	--
Forest land:							
Area (million acres)	393.7	370.6	94	9.7	2	13.4	4
Erosion (million tons)	370.0	99.1	27	35.2	9	235.7	64
Erosion rate (tons/acre)	0.9	0.3	--	3.6	--	17.6	--
Other rural land:*							
Area (million acres)	54.4	46.9	86	1.1	2	6.4	12
Erosion (million tons)	461.2	11.0	2	6.0	1	444.2	97
Erosion rate (tons/acre)	8.5	0.2	--	5.5	--	69.4	--

*Excludes 5.2 million acres of small built-up areas.

Most erosion problems, however, occur on relatively small proportions of the total cropland acreage. In 1982, sheet, rill, and wind erosion was at or below tolerable limits on 56 percent of all U.S. cropland. Significantly, 87 percent of cropland water erosion over tolerable limits was concentrated on only 10 percent of the cropland.

Costs of erosion. Erosion costs include onfarm losses of productivity and off-farm damages, such as damage to water quality, navigation, lakes and reservoirs, flora and fauna, and recreation values. These two kinds of costs have different policy implications. For example, on deep loess soils of western Iowa, annual erosion losses of 10 to 20 tons per acre for many years have led to no detectable decline in soil productivity, but have caused significant off-farm damages. In other areas, such as the Southeast, low erosion rates impair the productivity of shallow soils but cause little offsite damage. Consequently, policies to control one kind of erosion damage may not control the other kind.

Recent research suggests that, for the nation as a whole, the costs of off-farm erosion damage may be substantially greater than the costs of productivity loss. The Conservation Foundation estimates that off-farm damage costs at least $3 billion annually. Based on the estimated 1.9 billion tons

of total sheet, rill, and wind erosion on cultivated cropland in 1977, SCS economists in 1980 estimated that annual onfarm productivity losses from erosion are on the order of $1.3 billion.

Recent research in the Corn Belt has begun to provide a basis for understanding the national impact of erosion on crop production. In the Corn Belt, 83 percent of the cropland is projected by the research to have an 8 percent or less loss of productivity in the next 100 years, if erosion rates remain constant and farmers practice high levels of management. On 17 percent of the Corn Belt cropland, loss of productivity would exceed 8 percent. On some shallow soils, productivity loss would approach 50 percent.

Research outside the Corn Belt is incomplete. This and other research, including analyses of the USDA Erosion Productivity Index Calculator (EPIC), will begin to provide national-level data early in 1985.

Increase in highly erodible cropland. Cropland acreage increased only 2 percent from 1977 to 1982, but nearly half of the increase--about 4 million acres--was on land that has a high erosion hazard and is of marginal value for crop production. Secretary Block has commented, "This tends to support our concerns that significant plowouts of grasslands may be occurring in several states." The most dramatic examples of plowouts of prairie grassland are in the western Great Plains, usually for wheat cultivation, by so-called "sodbusters."

About 153 million acres not currently cropped have high or medium potential for conversion to cropland. Of this potential cropland, 71 percent is grazing land and 27 percent is forest. However, 93 million acres of these lands are highly erodible.

Planning for erosion control. Erosion is the combined result of physical factors (mainly soil properties and climatic forces) and management factors (soil cover and conservation practices). Conservationists and researchers have known this for many years, but only since the 1977 NRI became available have they been able to apply this knowledge to a comprehensive, national data base on soil erosion.

By separating the relative importance of physical and management factors, researchers have been able to classify soils on the basis of inherent erodibility and response to conservation treatment. Several such classification systems are being developed simultaneously. One system places U.S. cropland in three categories of susceptibility to sheet and rill erosion, using data from the 1982 NRI: nonerosive cropland (39 percent of all cropland), on which erosion-control practices are not required to keep sheet and rill erosion at or below T; moderately erosive cropland (54 percent), on which conservation systems can reduce erosion to T; and highly erosive cropland (7 percent), on which the application of current conservation technology probably could not reduce erosion to T. In comparing these results with earlier results based on the 1977 NRI, the Economic Research Service found a 2-million-acre decrease in highly erosive cropland and an 8-million-acre increase in nonerosive cropland from 1977 to 1982.

This classification has implications for conservation planning. Some practices may not be needed for erosion control on nonerosive cropland,

although they may provide other conservation benefits, such as improved soil tilth or water conservation, that make them cost effective. On highly erosive cropland, land use change may be the only way to reduce sheet and rill erosion to tolerable levels. It would also be appropriate to concentrate the installation of cropland conservation practices on that portion of moderately erosive cropland that currently is not being managed to reduce erosion to the T value--but could be so managed. Maintenance efforts should focus on the moderately erosive cropland that is currently managed to reduce erosion to T or less.

One limitation of this classification system, however, is that it addresses only sheet and rill erosion--not gully or wind erosion. Wind erosion accounts for about 40 percent of gross erosion on cropland, and many soils that have a low rate of sheet and rill erosion have a high rate of wind erosion. With new data from the 1982 NRI, a system for classifying soils by wind-erosion hazard could be developed.

Other soil factors affecting productivity

Other soil-related factors that affect productivity include soil salinity, inadequate drainage, and soil compaction.

Salinity. In many parts of the arid West, soils contain salts that have built up over centuries. These salts are frequently derived from materials deposited in beds of ancient saltwater seas. Rainfall is insufficient to flush the excess salts through the soil profile beyond the reach of plant roots or into the water table. More than 20 percent of western soils have significant salinity.

Saline seeps have developed in dry cropland areas of Montana and North Dakota. On lands that lie in summer fallow, excess moisture moves through topsoil to salty layers below. Accumulating there, the salt-laden water moves downslope and seeps to the surface through capillary action or lateral flow. A white salt crust appears at the surface, and crop or grass production is reduced or eliminated. Salt accumulation can be controlled through careful irrigation water management, erosion control, and crop management practices.

Drainage. Productivity can be increased by improving drainage on some land that is now cultivated. Of the 101 million acres of wet soils (capability subclasses IIw, IIIw, and IVw) that are now cultivated, about 30 million acres have drainage systems that are inadequate for maximum crop production. Yields on poorly drained soils can be increased as much as 50 to 100 percent when adequate drainage is provided. Considerable energy savings per unit of production can be achieved with drainage through reduced power requirements for tillage operations and increased yields per acre. Increasing the yields on existing land also reduces the need to shift production to more marginal land that may not currently be cropland. On many soils that have both wetness and erosion problems, drainage is required for cost-effective erosion control.

Soil compaction. In its natural state, soil is about one-half solid material and one-half open pore space. This pore space provides channels for air, water, plant roots, and soil micro-organisms. When soils are compacted or crushed, the amount of pore space is reduced and soil quality diminishes.

Soil compaction is a serious problem in many cultivated areas. Compaction and poor soil structure (decreased soil tilth) reduce root penetration, decrease the rate of water infiltration, increase runoff and erosion, and result in lower crop yields. They also decrease the movement of water and air in the soil and reduce the ability of soil to hold water in a form that is available to plants.

Cropping practices and soil management systems can rebuild soil structure and increase the supply of organic matter, thereby alleviating the effects of compaction.

Pasture, range, and forest

About 62 percent, or 933 million acres, of the Nation's nonfederal land is classified as pastureland, rangeland, and forest land. Average annual wind erosion on these lands was negligible except on rangeland, where soil loss was 1.5 tons per acre. Average annual sheet and rill erosion on these lands decreased from 1977 to 1982:

	1977	1982
	(tons/acre)	
Pastureland	2.6	1.4
Rangeland	2.8	1.4
Forest land (grazed)	3.9	2.3

Pastureland. Pastureland provides grazing through introduced forage plants established by seeding. About 54 percent of the Nation's forage production on private lands is on pasture. Lands unsuitable for cultivation because of soil limitations usually yield the highest returns if established to well-managed pasture or forest. Where lack of moisture is the limiting factor for cash crops, rangeland is generally the more productive use.

In 1977 and 1982, pastureland acreage was approximately the same--133 million acres. By comparison, there were 102 million acres of pastureland in 1967. In 1982, 41 percent of pastureland was in good condition, 40 percent in fair condition, and 19 percent in poor condition. As demand for cash crops increases, significant amounts of pastureland acreage may be converted to cropland.

Rangeland. Rangeland is land on which the natural potential (climax) plant cover is principally native grasses, forbs, and shrubs valuable for forage. Except for brush control, rangeland is managed primarily by regulating the intensity of grazing and season of use. If the land is revegetated, the improved forage cover is managed like native vegetation.

Many range scientists believe that nonfederal rangelands are in their best condition of this century. Degradation was severe before the 1930's. In 1982, of the 406 million acres of nonfederal rangeland, 9 percent was in excellent condition, 30 percent good, 45 percent fair, and 16 percent poor. While the long-term trend in range condition appears to be improving, about 60 percent of rangeland remains in fair or poor condition. Range acreage that could benefit from brush management remained at 63 million acres from 1977 to

1982. Acreage that could benefit from reestablishment through reseeding or brush management decreased from 24 million to 17 million acres.

In 1982, combined sheet, rill, and wind erosion was below tolerance (T) values on 83 percent of nonfederal rangelands, 6 percent (26 million acres) was eroding at one to two times the tolerance value, and 11 percent was eroding in excess of 2T. However, many range scientists believe that T values established for rangeland soils may be too high to permit sustained production of range plants indefinitely and economically. They maintain that range condition and trend are more sensitive indicators of range health and that natural plant communities may be irreparably damaged before erosion exceeds the T level.

Forest land. Recent analysis indicates that 37 percent of nonfederal forest land is adequately treated to control soil erosion and other problems that would limit sustained productive use of the forest resource base. Another 58 percent (230 million acres) may benefit from conservation treatment to improve timber stands and limit erosion.

Present timber production on nonfederal forest land is significantly below levels that could be achieved. According to a recent U.S. Forest Service report, average net annual timber growth on commercial timber land is about 45 cubic feet per acre. This is about three-fifths of what could be attained in fully stocked natural stands and far below what could be achieved with intensive management practices, such as spacing control, and with genetically improved planting stock and fertilizers.

Water resources

Too much water means flooding; too little means drought and lower productivity. Contaminants in water create potential health hazards and reduce crop productivity.

The necessity of water for agriculture has led to a significant Federal role in irrigation. The Federal Government, through construction and cost-sharing programs, has contributed 45 percent of the net value of all irrigation, drainage, and conservation facilities in the United States. Beginning with passage of the Clean Water Act in 1973, the Federal role in ensuring water quality has increased and has affected agricultural uses of water.

Quality. The Environmental Protection Agency (EPA), in partnership with state and local governments and other Federal agencies, has responsibility for water quality in three areas: reducing pollution of rivers, lakes, streams, and coastal waters; preventing contamination of ground water; and maintaining the purity of drinking water. While no Federal statute directly addresses groundwater quality, several laws regulate sources of ground-water contamination: the Safe Drinking Water Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, and Federal Insecticide, Fungicide, and Rodenticide Act.

Water quality problems fall in four categories of pollution sources: municipal (sewage), industrial (manufacturing), nonpoint (runoff), and dredge and fill activities.

"Nonpoint" refers to multiple, diffuse sources of pollution, as opposed to a single "point" source such as a discharge pipe from a factory. Farmland--from which runoff washes soil, chemicals, and nutrients into streams--is a major nonpoint source.

In 1982 every state reported water pollution problems caused by nonpoint sources such as agricultural, urban, or construction-site runoff. Approximately half indicated that nonpoint sources were major contributors to their water quality problems. About one-fifth of the states identified nonpoint sources as the primary cause of surface or ground-water pollution.

The most pervasive nonpoint source pollutants are sediment, dissolved salts, agricultural chemicals, and plant nutrients. Some contaminants are transported from farmlands by rain and irrigation water runoff. Others move by deep percolation into underground aquifers. Nutrients include animal wastes and fertilizers; the chemicals are primarily pesticides. Sediment--soil and organic materials--is the largest contributor by volume to nonpoint source pollution. It adversely affects portions of more than two-thirds of all U.S. river basins. Chemicals such as pesticides and nutrients often bind to sediment particles.

The Clean Water Act sets national goals for pollution control but places the responsibility for control at the state and local level. EPA provides grants to assist state agencies in developing water quality management plans, but implementation of these plans is up to state and local governments. Most often, the plans rely on "best management practices" voluntarily applied to reduce nonpoint source pollution. For example, conservation tillage reduces erosion--and the sediment content in runoff--by leaving crop residues on the soil. Streambank protection practices reduce sediment loading of streams. Contour plowing and terraces slow and reduce runoff from sloping lands. Nineteen states have assistance programs for best management practices in agriculture.

In 1975 Congress authorized EPA to study resource conditions and trends in the Chesapeake Bay and to recommend ways to improve its water quality. Findings of the study documented a relationship between declining marine resources and increasing nutrients and toxins. The study also showed the need for controlling point and nonpoint sources of these pollutants and recommended several strategies. The resulting Chesapeake Bay Program is a joint effort of five states and the District of Columbia as well as EPA and USDA. An important part of the effort is encouraging farmers in the Bay's drainage basin to control the loss of nutrients and sediment from their land. The strategies being developed and implemented include educational programs, cost sharing, and increased technical assistance for best management practices.

Quantity. Agriculture is by far the Nation's biggest water user, withdrawing about two-thirds as much water as all other users--municipal and industrial--combined. Rivers and streams are the major source of the Nation's water supply, but much of the country depends on water storage facilities and ground water. In most areas streamflow is a direct result of rainfall. In the West, however, it is also the result of snowmelt each spring, which supplies streams and downstream reservoirs. In many areas of the West, up to 75 percent of the annual runoff occurs during a few weeks in the spring during the snowmelt period.

Annual precipitation ranges from less than 4 inches in parts of the Great Basin to more than 200 inches along the Pacific Northwest coast, for a national

average of 30 inches. More than two-thirds of the precipitation returns to the atmosphere. On the average about 9 inches--1,300 billion gallons per day (bgd)--either infiltrates into the ground-water table or enters surface water storage before eventually reaching the ocean. Only a fraction--106 bgd--is put to productive uses.

Dams and reservoirs are crucial to water supply. Reservoirs in the United States can store 225 trillion gallons of water. There are more than 2 million small reservoirs, but the 49,000 large reservoirs are the primary contributors to increased agricultural production. Just 31 of these reservoirs account for 41 percent of the Nation's total reservoir storage capacity.

The Nation's ground-water resources are far greater than the total capacity of all lakes and reservoirs, including the Great Lakes. The volume is equivalent to about 34 years of surface runoff and includes vast underground lakes such as the great Ogallala Aquifer, which underlies parts of eight states in the Great Plains. In 1975 ground water accounted for nearly one-fourth of the fresh water consumed in the United States, with agriculture using about half.

Ground water is replenished slowly. An average of 3 inches of the water that soaks into the ground each year passes beyond the soil moisture zone and recharges ground-water supplies. Although there are numerous large reservoirs of ground water from which water can be feasibly withdrawn, recharge from precipitation is inadequate for replenishment in some areas.

In 1958 only 37 million acres of land were irrigated. By 1967, 47 million acres were irrigated; by 1977, 63 million acres. In the 1982 NRI, 66 million acres were classified as irrigated. (This classification is based on irrigation during at least two of the four years preceding the inventory.) In the decade from 1967 to 1977, irrigated acreage increased at an annual rate of 1.6 million acres. This increase slowed to 600,000 acres per year between 1978 and 1982.

In sections of the Great Plains, irrigation with center-pivot sprinkler systems has replaced dryland farming. Irrigation is also increasing in humid areas of the South, where crops need supplementary water in late summer. For example, irrigated land in Georgia increased from 636,000 acres in 1977 to more than 1 million acres in 1982.

Water tables are dropping 3 to 5 feet each year in some areas. Agricultural production based on ground-water mining is expected to become impractical within the next 30 years on 6.6 million acres; 4.5 million of these acres are in Texas, Oklahoma, Kansas, and New Mexico. Decreasing availability and increasing cost of ground water threaten the loss of crop production valued at $2.5 billion (1980 dollars), abandonment of cropland or conversion of cropland to rangeland, and dislocation of 14,000 farm units in the Southwest.

In water-short areas, competition from domestic, industrial, and energy production uses will further limit water supplies available to agriculture. Nonagricultural consumptive uses are expected to double in the next 30 years. The net value of water used for irrigated agriculture is not high enough to compete with the value of water used for industrial or domestic purposes under free-market conditions. Under market conditions, nonagricultural users bid water away from agriculture as their demand for water increases. Increasingly, industrial users and municipal systems purchase agricultural land solely to convert its water rights to another use. Instream flow needs for fish, wildlife, and water quality may be significantly affected in some locales.

In one-fifth of the Nation's drainage basins, depleted streamflow has become a serious problem. By the turn of the century, flows in 22 percent of the water-resource subregions will be too low to sustain habitat for most aquatic life forms. Diminished flows will cause environmental strain in another 34 percent of the subregions.

The Bureau of Reclamation, with an annual budget of approximately $1 billion, constructs major water projects in the 17 Western States for power generation, flood prevention, maintenance of flow, irrigation, and recreation. Although a number of those water projects were cost-shared with states, Federal pricing policies have effectively underpriced irrigation water in some arid western regions. The Bureau of Reclamation's irrigation program serves 10 million acres of irrigated land; less than 2 million acres could be added when all projects under construction are completed.

The Reclamation Reform Act of 1982 required USDA to submit a report on the production of surplus crops on acreage served by irrigation water. The report, submitted in early 1984, found that water project and commodity program objectives often worked at cross-purposes, but enrolling Bureau-served farmers in acreage reduction programs would require rules too complex to administer effectively. Instead, Secretary of Agriculture John Block has recommended, "Future projects should be justified on the basis of their ability to produce crops at market clearing prices free of subsidy. In addition, farmers who are served by Federal project water should be expected to repay the full cost of irrigation project water development and delivery, including the principal and interest."

Flooding. There are 175 million acres of flood-prone land in nonfederal rural areas, excluding Alaska, or about 9 percent of the total surface area of the contiguous United States. About 52 million acres are forest land, 48 million acres are cropland, 35 million acres are rangeland, and 20 million acres are pastureland.

Primary Federal responsibility for flood prevention in downstream areas rests with the U.S. Army Corps of Engineers. USDA, through the Soil Conservation Service, carries out a flood-prevention program for small upstream watersheds (less than 250,000 acres).

Upstream flood damages are primarily defined in terms of the annual dollar damage to cropland, pastureland, urban land, and other property. Other damages cannot be described in monetary terms--loss of life, threat to health, and disruption of the environment (for example, loss of fish and wildlife habitat). People who live on the flood plain are not the only ones who suffer losses. Others are affected by the disruption of the economy during and after a flood and by the cost of relief and reconstruction in the area. Flood damages to cropland, pastureland, urban land, and other properties in upstream areas were slightly more than $1 billion in 1975 (in constant 1967 dollars). These same damages expressed in 1984 dollars would be more than $3 billion. Incomplete data indicate that the level of damages may be as much as 25 percent greater.

Existing USDA Conservation Programs

At present, eight USDA agencies administer 26 programs that affect soil and water conservation. Among the largest are the Agricultural Conservation Program (ACP), authorized by the Soil Conservation and Domestic Allotment Act of 1935 as the principal mechanism for Federal cost sharing; the Conservation Technical Assistance Program authorized by the same act; watershed protection and flood prevention efforts authorized by Congress in 1944 and 1954; the Great Plains Conservation Program authorized in 1956; the Water Bank Program; and the Forestry Incentives Program. Including USDA research, education, and extension programs, total conservation funding is currently about $1 billion annually. The total Federal investment in conservation programs since 1935, expressed in 1984 dollars, amounts to $90 billion. Trends in conservation appropriations since 1970 are shown in table 3 on page 20.

Agricultural Conservation Program

ACP is the largest USDA cost-sharing conservation program. The program is managed by the Agricultural Stabilization and Conservation Service (ASCS) and provides financial assistance to agricultural producers in carrying out approved soil and water conservation practices. ACP includes both long-term (3- to 10-year) and short-term (1-year) agreements for financing conservation practices. The Agricultural Conservation Program is designed to reduce soil erosion and water pollution, protect and improve productive farm and rangeland, conserve water used in agriculture, preserve and develop wildlife habitat, and encourage energy conservation. Practices are eligible for cost-share assistance if they contribute to these objectives and would not be undertaken without financial and technical assistance. Improvements are not eligible for ACP cost sharing if they are primarily production oriented or would result in significant economic benefits to the farmer or rancher.

Since the beginning of the ACP in 1937, the program has cost $12.7 billion. Approximately 94 percent of ACP funding is used for cost sharing with agricultural producers. Up to 5 percent is transferred to SCS for technical services and 1 percent to the Forest Service for support of state forestry agency services on woodland management practices. In fiscal year 1984 the ACP appropriation was $190 million.

The Federal Government pays up to 75 percent of the cost of approved practices, not to exceed a maximum of $3,500 per farmer per year. The county Agricultural Stabilization and Conservation (ASC) committee, elected by farmers, recommends which problems and solutions appear to be appropriate for cost sharing. SCS and the Forest Service provide technical advice for establishing and implementing approved conservation practices. The county Cooperative Extension Service provides educational support.

An ASCS evaluation of the Agricultural Conservation Program in 1981 led to significant improvements in the program. The evaluation concluded that --

- Most ACP practices do reduce soil erosion and conserve water, but their costs and benefits vary considerably by region of the United States and within each region.

- About four-fifths of all excess sheet and rill erosion on agricultural

Table 3.--USDA conservation programs: Appropriations trends from 1970 to 1985

Program and agency	1970	1975	1980	1984	1985 (Est.)
	----------(million dollars)----------				
TECHNICAL ASSISTANCE					
Conservation Technical Assistance (SCS)	109.0	162.0	206.4	275.0	276.0
Cooperative Forestry Management (FS)....	3.7	5.7	5.0	5.2	6.9
FINANCIAL ASSISTANCE					
Great Plains Conservation Program (SCS)	15.3	20.2	18.7	21.3	21.3
Agricultural Conservation Program (ASCS)	195.5	190.0	190.0	190.0	190.0
Water Bank Program (ASCS).....	--	2.1	10.0	8.8	8.8
Forestry Incentives Program (ASCS).....	--	15.0	15.0	12.5	12.5
Administration costs for ACP, WB, FIP (ASCS).....(Data unavailable)			47.7	34.9	37.0
Resource Conservation and Dev. Program (SCS).....	10.8	20.3	32.0	26.0	26.0
Watershed Planning (SCS).....	6.7	11.1	11.0	8.7	8.8
Small Watershed Program (SCS).....	66.0	103.1	136.8	150.0	150.0
Flood Prevention Program (SCS).....	20.7	21.1	18.5	23.2	27.3
LOANS					
Watershed, RC&D Loans (FmHA).....	5.1	23.0	10.3	30.0	16.0
Soil and Water Conservation Loans (FmHA)	4.1	3.1	46.0	31.0	28.0
EXTENSION					
Information and Education (ES).....(Data unavailable)			10.3	15.9	16.0
RESEARCH-TECHNOLOGY DEVELOPMENT					
Resources Economics Research (ERS).....	0.6	1.0	2.4	4.0	8.0
Forest Watershed Mgt. Research (FS).....	4.4	8.3	8.3	9.5	9.2
Plant Materials Centers (SCS).....	1.2	2.4	3.0	4.0	4.0
Agricultural Research (ARS).....(Data unavailable)			30.4	57.7	60.0
Cooperative State Research (CSRS).....(Data unavailable)			25.5	27.5	29.0
DATA COLLECTION AND ANALYSIS					
Inventory and Monitoring (SCS).....	--	--	13.4	14.4	14.4
River Basin Surveys and Investigations (SCS).....	8.8	14.5	16.4	15.6	14.7
Resource Appraisal and Program Dev. (SCS).....	--	--	4.3	4.3	4.3
Snow Survey and Water Forecasting (SCS)	--	2.5	4.1	3.9	3.9
Soil Surveys (SCS).....	21.6	31.1	43.5	53.5	53.7
TOTAL (excluding loans and emergency programs).....	464.3	610.5	867.2	965.5	981.8

land is concentrated on the 4 percent of the acreage that is eroding at rates of more than 14 tons per acre annually. However, many erosion-control practices were installed on lands with relatively low rates of sheet and rill erosion. More than 52 percent of ACP cost-shared practices for erosion control were installed on lands on which average annual sheet and rill erosion was less than 5 tons per acre. It should be noted, however, that the soil loss tolerance on much rangeland is 2 tons per acre. In addition, the ASCS evaluation did not address the impact of ACP cost-shared practices on wind erosion, water quality, farm income, public benefits, crop yields, wildlife, soil tilth and fertility, and topsoil depth.

- Effective targeting of erosion-control funds based on the potential for erosion reduction could triple the amount of soil saved by ACP. Achieving these improvements hinges on the willingness of farmers with severe erosion problems to participate in the program. Further increases could be achieved by concentrating assistance on the most efficient practices, such as stripcropping, conservation tillage, and competitive shrub control.

- Water conservation practices affecting 240,000 irrigated acres were analyzed in the study. The potential for onfarm water conservation varies with the amount of water used per acre. However, 63 percent of practices were installed on lands receiving low rates of water (4 feet or less per acre annually) prior to assistance. Less than 4 percent of water conservation practices were installed on lands on which more than 8 feet of water was being applied, and yet these cases accounted for more than 33 percent of the total volume of water conserved.

- 61 percent of seeding practices were on land with annual sheet and rill erosion of less than 5 tons per acre.

As a result of its evaluation, ASCS has begun to offer a new method of establishing cost-share levels under the Agricultural Conservation Program. Variable cost-share levels were tried on a voluntary basis in 185 counties in FY 1984. Under this approach, ASCS sets cost-share levels based on the severity of the erosion problem before treatment and the expected amount of soil erosion reduction.

The average total cost of sheet and rill erosion reduction for nine conservation practices applied under the Agricultural Conservation Program was $2.22 per ton during the 1975-78 period. Directly comparable data have not been analyzed, but the average cost per ton for all practices applied was $2.05 in 1983 for sheet, rill, gully, and wind erosion. These program improvements are primarily the result of program redirection and more effective priority setting.

Conservation Technical Assistance

Since 1936, the Federal Government has invested $3.6 billion in SCS Conservation Technical Assistance (CTA) for the planning and application of conservation systems with land users. In fiscal year 1984 the CTA appropriation was $275 million. CTA is the base of SCS operations and accounts for 58 percent of all SCS technical assistance expenditures.

The CTA program is designed to help land users reduce soil losses from erosion; help solve other soil, water, and agricultural waste management problems; bring about adjustments in land use; and reduce damage caused by excess water and sedimentation. Conservation Technical Assistance is provided through and in cooperation with local conservation districts. SCS soil conservationists assigned to a conservation district work directly with land users and others according to program needs and priorities established by the district. If a farmer desires assistance and contacts the district, free technical assistance is provided. SCS helps program participants develop conservation plans, including those needed for long-term cost-sharing agreements.

Beginning in the early 1940's, allocation of CTA funds to SCS state offices was strongly influenced by the number of conservation districts in the state. As new districts were organized in the state, more CTA funds were earmarked for the SCS state office. This basic formula was used through 1982, when it was overhauled to relate allocations of CTA more closely to resource problems and needs.

In a 1977 report, GAO noted that SCS had taken a generally passive approach in carrying out the CTA program by waiting for farmers to seek assistance rather than seeking out farmers whose land had serious conservation problems. GAO observed that, while much time was spent preparing elaborate plans for individual farms, many plans were outdated or were never carried out by the farmer. The report recommended that SCS realign its priorities, aggressively seek out farmers whose lands have critical erosion problems, and provide the necessary technical and follow-up assistance.

In 1981 SCS began targeting a portion of its technical assistance to areas with severe resource problems. (ASCS also designated cost-sharing funds for these areas beginning in 1982.) SCS has also made progress in placing less emphasis on planning documents and more emphasis on applied conservation. A 1983 SCS evaluation of CTA, still in draft, concludes that--

- 64 percent of onsite technical assistance was primarily for erosion control, 13 percent for water conservation, and 10 percent for forage improvement.

- Of all the land on which erosion control was the primary reason for applied assistance, 30 percent of the assistance was on land eroding at annual rates of less than the soil loss tolerance. This acreage accounted for less than 11 percent of the reduction in erosion.

- Lands with high erosion hazard as indicated by their capability classification accounted for 60 percent of the acreage treated by CTA and 79 percent of the sheet, rill, and wind erosion reduced.

- 65 percent of Conservation Technical Assistance time spent on erosion control was associated with cost-shared applications; one-third of the acres treated for water conservation received cost-sharing; and the majority of forage improvement was achieved without cost-sharing.

- Nationally, the cost of CTA direct assistance was 8¢ per ton of erosion reduction. In areas targeted for erosion control, the CTA investment was 7¢ per ton.

- The total investment in conservation during 1983 that was associated with CTA services was $1.2 billion. Seventy percent of that investment was made by private land users. Nearly 13 percent was public cost sharing, and 17 percent was the cost of technical assistance.

Watershed protection and flood prevention efforts

USDA provides technical and financial assistance in accelerating land treatment and in planning and carrying out works of improvement to protect and develop land and water resources in small watersheds. Three principal programs make up the USDA watershed protection and flood prevention efforts: Flood Prevention Operations authorized by Public Law 78-534, the Small Watershed Protection Program authorized by Public Law 83-566, and River Basin Surveys and Investigations authorized by Public Law 83-566 as amended.

Since 1947 when it was authorized, the Flood Prevention Operations program has invested $1.1 billion for flood control in 11 watersheds authorized by the Congress because of critical problems. In fiscal year 1984 the appropriation was $23.2 million.

The Small Watershed Protection Program was authorized in 1954 and has invested $2.8 billion in planning and installing flood-control structures, land treatment measures, and other facilities in upstream watersheds. For fiscal year 1984 the appropriation was $158.7 million.

The River Basin Surveys and Investigations program has invested $226 million since 1969 to study and to recommend solutions to natural-resource problems in the Nation's river basins. In fiscal year 1984 Congress appropriated $15.6 million for these activities.

In small watershed projects SCS provides assistance to local sponsoring organizations in planning, designing, and installing watershed works of improvement and in sharing the costs of measures for flood prevention, irrigation, drainage, sedimentation control, public water-based fish and wildlife habitat and recreation areas, and watershed protection. Assistance is also provided in extending long-term credit to help local organizations with their share of the costs. The program is limited to watershed areas less than 250,000 acres. The capacity of a single structure is limited to 25,000 acrefeet of total capacity and 12,500 acre-feet of floodwater detention capacity. Since the program began in 1954, 610 projects have been completed. Construction is underway on 474 projects, 131 have been planned and await construction, and 107 have been discontinued.

Great Plains Conservation Program

GPCP was authorized in 1956 as a voluntary program to help Great Plains farmers and ranchers protect their light and fragile soils from erosion and to stabilize production in this drought-prone area. Despite typical rainfall of only 10 to 20 inches per year, the Great Plains produces 60 percent of the Nation's wheat and 30 percent of the beef cattle. The Great Plains Conservation Program provides cost sharing to farmers and ranchers for conservation practices applied under a long-term contract.

The Federal Government has invested $459 million in the Great Plains Program through SCS. This investment includes both financial assistance and technical services. In fiscal year 1984 the GPCP appropriation was $21.3 million.

In 1984 SCS began an in-depth evaluation of the Great Plains Program. That evaluation is scheduled to be completed in early 1986. Earlier evaluations indicate that each Federal dollar invested in GPCP has yielded nearly $4 in increased agricultural income.

At present, 519 counties in 10 states participate in the GPCP. After USDA determines a county's eligibility and designates it for participation--

- o A landowner in an eligible county develops a conservation plan to meet the needs of the farm or ranch. SCS provides technical help.
- o The landowner signs a contract with USDA, agreeing to install the conservation practices over a 3- to 10-year period.
- o USDA pays the landowner 50 to 80 percent of the cost of each approved practice as it is completed. The rate varies, depending on how urgently the practice is needed in an area. Each SCS state conservationist sets the priorities on where funds will be provided and what the rate will be for each practice.
- o The maximum USDA payment for any one contract is $35,000.

By the early 1980's, approximately 60,000 farmers and ranchers had entered into GPCP contracts with SCS. They had established more than 5 million acres of permanent plant cover on land difficult to protect when in crops, planted 65,000 acres of windbreaks, built 15,000 miles of pipelines to carry water to livestock, and switched to stripcropping on more than 1 million acres. About 10,000 contracts are still active.

Water Bank Program

The Water Bank Program was authorized in 1972 to conserve surface water, preserve and improve migratory waterfowl habitat, reduce runoff and wind erosion, improve flood control, reduce acreage of wetlands brought into agricultural production, retire lands then in production, and promote water management planning.

Since 1972, $107 million has been invested in this program. The fiscal year 1984 appropriation was $8.8 million.

ASC county committees administer the program; SCS provides technical services. The Water Bank Program applies to wetlands identified in a conservation plan developed in cooperation with the conservation district. Eligible persons may sign 10-year agreements with provisions for annual renewal and receive annual payments. Owner-operator participants agree (1) not to drain, burn, fill, or in other ways destroy the wetland character of areas placed under the agreement; (2) not to use such areas for agricultural purposes; and (3) to carry out the agreed-upon wetland conservation and development plan.

In recent years ASCS has taken steps to increase involvement of the Interior Department's Fish and Wildlife Service (FWS) and more fully use the wetlands expertise of FWS. The resource and program appraisal submitted by USDA in 1981 (as directed by the Soil and Water Resources Conservation Act of 1977) concluded that the program had not significantly reduced conversion of wetlands to agricultural use.

Forestry Incentives Program

Authorized initially in 1974 and reauthorized in 1978, the Forestry Incentives Program (FIP) operates under the Cooperative Forestry Assistance Act. The Forestry Incentives Program is designed to increase the supply of timber products from private, nonindustrial forest lands. The program encourages landowners to plant trees on suitable open lands or cut-over areas, and to improve timber stands. ASCS administers the program and provides cost-sharing for tree planting, timber stand improvement, and other forestry practices that increase the supply of timber. The Forest Service provides additional funding, beyond that reimbursed by ASCS for technical assistance, to state forestry agencies, which provide the technical assistance to land owners.

Since 1975 ASCS has spent $124 million for FIP activities. In fiscal year 1984 the appropriation was $12.5 million.

Cost-sharing assistance cannot exceed 65 percent of the cost of the practice. In some states, assistance is available under 3- to 10-year agreements. The maximum annual cost-sharing contribution for forestry practices under the program is $10,000.

Conservation and the 1981 Farm Bill

The 1981 Agriculture and Food Act contains several provisions affecting USDA conservation activities and programs. The Act establishes three significant new programs that have not yet been funded by congressional appropriations: Designated Special Areas, Matching Grants, and Conservation Loans. This section summarizes these programs and some other conservation-related provisions of the 1981 farm bill.

Designated Special Areas Program

This program, if funded, would target additional technical and financial assistance to areas designated by the Secretary. These areas must have severe and chronic erosion or water-management problems. The Secretary would enter into long-term contracts with farmers and ranchers to provide cost sharing and technical assistance. In return, the land user would agree to carry out provisions of a conservation plan approved by USDA and the conservation district. This program would be similar to current USDA targeting initiatives except that--

- Special-area appropriations would be new rather than redirected from existing resources.

- Special areas would be implemented entirely through long-term contracts rather than through annual cost-sharing agreements.

- The Act requires USDA to provide an opportunity for the appropriate Congressional committees to comment on the Secretary's proposals to designate specific special areas.

Funding for the special-areas program has not been requested by the Department or appropriated by Congress because of the emphasis on targeting of existing USDA conservation programs since 1981.

Matching grants

The 1981 farm bill authorized the Secretary of Agriculture to assist local conservation district efforts by providing matching grants through state soil conservation agencies. No funds for these grants have been appropriated, although the President's 1983 budget requested $10 million. Under the matching-grants program, USDA would be authorized to meet up to 75 percent of the cost of activities directed at erosion control, water conservation, and reduction of upstream flood damage. The existence of a local conservation program would be a condition for receiving a USDA grant. The use of grant funds would be limited to noncapital expenditures associated with technical assistance to land users.

Conservation loans

The 1981 farm bill authorized the Commodity Credit Corporation to make loans to farmers for "natural resource conservation and environmental enhancement measures" recommended by county and state ASC committees and included in a conservation plan approved by the local conservation district. The loans are for no more than 10 years in amounts not to exceed $25,000. No funds have been requested by the Administration or appropriated by Congress.

Other provisions

Conservation tillage. Congress found that conservation tillage practices can reduce erosion by 60 to 90 percent while also resulting in better yields, greater land-use flexibility, decreased fuel use, decreased labor and equipment costs, increased retention of soil moisture, and more productive land. Therefore, in Subtitle J of Title XV of the 1981 farm bill, Congress urged and requested that the Secretary of Agriculture (1) direct the attention of farmers to the costs and benefits of conservation tillage and (2) conduct a program of research to resolve questions about the advantages and disadvantages of conservation tillage. The Secretary has taken action to implement both recommendations.

Conservation research. In Section 1402 (Title XIV) Congress called for reaffirmation and expansion of national support of cooperative research, extension, and teaching in several areas of agricultural interest, including the following natural-resource objectives:

- Sustaining soil productivity.

- o Developing more cost-effective and practical conservation practices.
- o Managing water in stressed environments.
- o Protecting the quality of the Nation's surface- and ground-water resources.
- o Implementing the research recommendations of a USDA study on organic farming.

Resource conservation and development. The 1981 farm bill updated and redirected the Department's Resource Conservation and Development (RC&D) Program (Title XV, subtitle H). It increased the emphases on land conservation, water management, community development, and other purposes. It set a cap of 225 active RC&D areas, authorized USDA to withdraw RC&D assistance where it is no longer needed, and set a cap of $15 million per year for loans.

Farmland protection. Subtitle I of Title XV is a "Farmland Protection Policy Act." This Act calls for USDA leadership in seeking to (1) minimize the effects of Federal programs on conversion of farmland to nonfarm uses and (2) make Federal programs compatible with state, local, and private programs and policies to protect farmland. The Act provides for USDA technical assistance, information, and grants.

The Farmland Protection Policy Act also called on USDA to develop criteria by which adverse effects of proposed farmland conversion could be identified and considered. The Act does not authorize the Federal Government in any way to regulate the use of private or other nonfederal land or property rights. Program regulations were published in the Federal Register on July 5, 1984.

USDA's National Conservation Program

The Soil and Water Resources Conservation Act of 1977 (RCA) directed the Department to "carry out a continuing appraisal of the soil, water, and related resources of the Nation" and "to develop in cooperation with and participation by the public through conservation districts...a national soil and water conservation program."

The first National Program for Soil and Water Conservation was sent to Congress by President Reagan in December 1982. It covered the 5-year period 1983-1987 and outlined the direction of soil and water conservation programs administered by USDA.

Soil and water conservation programs in USDA had never had clear national policies that set conservation priorities. They tended simply to provide services to landowners and communities on a "first come, first served" basis. For the first time, national conservation objectives were established and priorities set to (1) reduce excessive soil erosion on agricultural land and (2) conserve water used in agriculture and reduce flood damages in upstream

areas. In addition, USDA increasingly views water quality enhancement as a significant objective of conservation programs.

Because conservation problems vary in different parts of the country, the national program allows for USDA attention to local and state priorities as well. Local and state priorities are generally set from among the following national resource concerns: erosion control; water conservation; reduction of damage from upstream flooding; range, pasture, and forest land improvement; conservation and development of natural resources in urban and rural communities; improvement of fish and wildlife habitat; organic waste management; and water quality improvement. The National Conservation Program (NCP) contains three primary action components:

- Redirect conservation efforts more strongly to national priorities by focusing on priority problems, including targeting assistance to geographic areas where those problems are most concentrated,
- Strengthen the role of state and local conservation agencies in addressing resource problems and reinforce the Federal-state-local partnership in the conservation effort, including matching grants, and
- Improve USDA program management and coordination in ways that enhance program performance.

Targeting

USDA's soil and water conservation programs have tended to distribute funds and personnel more or less evenly throughout the United States. Resource data show, however, that soil erosion, water shortages, upstream flooding, and other resource problems are not evenly distributed.

A major feature of the NCP is the redirection of program efforts through (1) targeting an increased share of USDA assistance to areas with the most severe resource problems, (2) allocating appropriated SCS funds to states on the basis of the national priorities and the severity of resource problems in the states, and (3) focusing on priority problems in all areas--nontargeted as well as targeted.

Targeted areas are normally multicounty areas with severe soil erosion, water shortages, or damages from upstream flooding. Once an area has been designated, USDA accelerates technical assistance, cost sharing, and information activities until the priority problems are substantially controlled.

To target funds and personnel to these areas while still ensuring an adequate nationwide base program, the SCS and ASCS are committing an increasing percentage of their technical and financial assistance funds each year for 5 years to designated critical problem areas. In fiscal year 1984, 10 percent of technical and financial assistance funds were targeted. In the NCP, 25 percent of these agencies' technical and financial assistance would be committed to targeting by 1987. However, the House-passed version of the Agriculture appropriations bill for fiscal year 1985 froze targeting at the 1984 level unless the Department were to seek additional funds for targeting in a supplemental budget request.

By targeting funds and people to the most serious resource problem areas since mid-1981, USDA agencies have increased their effectiveness in reducing soil erosion and improving irrigation water management in parts of 31 states. During 1983, the second full year of targeting, farmers and ranchers reduced soil erosion in targeted areas by nearly 29 million tons and water losses by 276,000 acre-feet through accelerated application of soil conservation and water management practices. The rate at which erosion control was achieved in targeted areas was 16 percent higher than in nontargeted areas. Water conserved in targeted areas was nearly 25 percent higher per acre than in nontargeted areas.

Both ASCS and SCS have made progress in redirecting their allocation of funds and assistance to states and individual producers. SCS has revised its funding allocation formula. The new formula is being phased in gradually over a 10-year period. It uses 12 weighted factors that reflect, for each state, national resource needs, NCP priorities, and demands on SCS personnel resources. ASCS is pilot-testing a system that awards cost sharing on the basis of the severity of the producer's problems and the extent to which the requested practice would solve the problems.

Conservation partnership

A prominent feature of existing conservation programs of USDA is their link with the 2,950 conservation districts, which are units of local government established under state law. The key to operation of ASCS conservation and commodity programs is the system of farmer-elected ASC county committees.

To date, 44 states have prepared comprehensive soil and water conservation programs under the impetus of the Soil and Water Resources Conservation Act. Expenditures and services by state and local governments and the private sector for soil and water conservation programs have been increasing steadily in recent years. This increasing support is treated in more detail in the section, "State & Local Conservation Programs," page 30.

The National Conservation Program called for matching grants to conservation districts, through state agencies, as authorized in the 1981 Agriculture and Food Act. The President's Budget for 1983 requested $10 million for these grants but Congress did not appropriate any funds.

Management improvements

As part of the National Conservation Program, USDA has made management improvements that--

- Require conservation plans for recipients of some Farmers Home Administration loans.
- Emphasize conservation tillage.
- Promote rangeland and pastureland management systems.
- Increase consistency between USDA programs and conservation objectives.
- Increase the use of long-term agreements.
- Conduct pilot projects and emphasize conservation systems.

State & Local Conservation Programs

Most soil and water conservation programs are administered at the local level through soil conservation districts. The districts are authorized by state laws to study soil and water conservation problems, develop conservation programs, and provide technical and financial assistance to private landowners.

In fiscal year 1979 SCS provided matching grants to states to accelerate the development of state conservation programs. These grants, along with grants from the Environmental Protection Agency for the development of state water quality management plans, helped states assess their resource problems and plan solutions. The priorities in the plans vary, but three-fourths of them designate soil erosion as the number 1 or 2 priority. Priorities in the 42 plans received to date are as follows:

Priority problem	Rank of priority			
	1	2	3	4
	(Number of plans)			
Soil erosion	26	7	3	2
Water quality	2	5	5	2
Land use	2	4	6	6
Water supply	1	4	9	3
Water conservation (irrigation)	1	6	3	3
Forestry	0	3	5	3
Upstream flooding	0	2	3	2
Food and fiber production	4	8	2	3
Prime farmland	4	1	3	6
Rangeland improvement	2	0	1	1
Other	0	2	2	10
TOTAL	42	42	42	41

From 1979 to 1983, state and local governments increased their combined contribution to conservation by 17 percent to $224 million. State and local funds provided nearly 4,700 employees to the conservation effort in 1983. The table below compares recent trends in USDA funds for technical and financial assistance and state, local, and private funding and services for soil and water conservation.

Source	Funding in constant 1983 dollars					Change since 1979
	1979	1980	1981	1982	1983	
	millions					%
USDA	$602	$573	$543	$505	$483	-20
State and local	192	206	202	197	224	+17
Private	91	99	86	85	97	+ 7
TOTAL	885	878	831	787	804	- 9

Almost all districts rely heavily on voluntary farmer participation and Federal cost sharing and technical services instead of enforcement authority. However, the districts have more applicants than they can assist with available resources. Twenty-six states have given considerable regulatory power to the districts. The district may have the power to require particular methods of cultivation, such as contouring, or the retirement from cultivation of highly erosive areas.

Because a district typically is reluctant to require farmers to implement erosion-control practices unless cost sharing is available, it rarely exercises what regulatory authorities the state has given to it. In some states a district can enforce the erosion ordinance only if the district's farmers have voted for enforcement.

By 1984, 21 states offered cost sharing for conservation by a variety of formulas and mechanisms and for a variety of conservation purposes. The purposes include erosion control, water conservation, nonpoint water quality improvement, farmland protection, forest or rangeland protection and improvement, wildlife habitat, and drainage. The programs of four states, described in the following paragraphs, demonstrate the variety of funding sources and program objectives.

Iowa cost sharing. Iowa's cost-share program began in 1973. Patterned after the Federal Agricultural Conservation Program, it provides up to 50 percent cost sharing for approved permanent conservation practices and up to 75 percent cost sharing for mandatory practices installed to comply with the state erosion-control law. The Iowa Department of Soil Conservation manages the cost-sharing program through local conservation districts. For the state fiscal year that began in July 1984, $8.6 million was appropriated for the state cost-sharing program; two years earlier the amount was $5.6 million. Also, 22 Iowa counties offer cost-sharing through the districts.

In 1980 Iowa enacted legislation specifying long-term objectives for topsoil erosion control. The primary objective of the Iowa Soil 2000 Program is to reduce excessive erosion on all land in the state by the year 2000 through coordinated educational, financial, and technical assistance.

Idaho: Project approach to water quality. Since 1981, Idaho has provided about $2.5 million annually for cost sharing of practices to reduce water pollution from agricultural nonpoint sources. Cost sharing up to 90 percent is available for approved practices identified in the state's plan for managing agricultural water quality. The practices are consistent with SCS technical guides. The cost-sharing funds are used in nine water quality project areas established by the state. These projects are similar in design to land treatment-type small watershed projects of USDA, although the Idaho projects have water quality rather than watershed protection as the main objective. By November 1984, $6.7 million had been obligated for the projects. Two projects have been completed. The cost-share funds are raised through inheritance and cigarette taxes, which also provide funds for programs to reduce water pollution from point sources.

Illinois: Cost-shared compliance with erosion law. A small but ambitious cost-sharing program began in Illinois in 1983. The program provides funds to help landowners comply with the state erosion-control law. Complaints about erosion are received by the conservation district, which asks the landowner for permission to verify the erosion rate by use of the Universal Soil Loss Equation. If the complaint is valid, the district works with the landowner to develop a plan for reducing erosion to an acceptable level.

The program is very small compared to the potential scale of the farmland erosion problem in Illinois. In each of fiscal years 1983 and 1984, $50,000

was allocated for cost sharing. However, erosion exceeds 2T on parts of 22,000 Illinois farms.

Maximum acceptable erosion rates under the law will be lowered in 1988, 1994, and 2000. At present the maximum acceptable rate is four times the tolerance (T) value. In 2000 all the land must erode at no greater than T to comply. There is no penalty for failure to comply. However, of 53 complaints processed to date, 20 were judged invalid and landowner compliance on the rest was nearly 100 percent.

Missouri: State sales tax for conservation. In August 1984, Missourians voted to increase the state sales tax by one-tenth of a cent to aid conservation and the state park system. The tax, with a lifespan of 5 years, is expected to generate $30.5 million each year. Half will go to the park system and half to soil and water conservation. All expenditures must be approved by the state legislature, but projected distribution of the soil conservation funds is as follows: 50.8 percent for the state conservation cost-share program; 13.1 percent for a conservation loan interest program; 13.1 percent for nonfederal costs of small watershed projects; 13.1 percent for technical planning and clerical help for conservation districts; 6.6 percent for accelerating soil surveys; and 3.3 percent for administration and personnel. The tax is scheduled to take effect in July 1985.

Ties Between USDA Commodity and Conservation Programs

The primary objective of USDA commodity programs is to adjust production levels of certain commodities in an effort to enhance prices received by farmers. These programs have over the years included certain minimum conservation requirements on set-aside acreage. Conservation was a secondary purpose, but the benefits have at times been significant. The 1983 Payment-in-Kind program, for example, produced an average erosion rate reduction of 1.4 tons/acre on land in the program.

The primary objective of conservation programs is to protect our Nation's soil, water, and related resources so that they can continue to sustain needs for food and fiber both here and abroad. Commodity production effects are secondary, but sometimes complementary, effects of conservation programs, as in the conversion of cropland to grass or tree cover.

Historically, coordination of USDA efforts toward the two objectives has been irregular. However, one of the management improvements called for in the National Conservation Program is to increase the consistency between USDA commodity and conservation objectives.

The Economic Research Service (ERS) is completing an intensive study of the relationship between USDA's commodity (production adjustment and agricultural income support) and conservation programs in response to the NCP. The aims are to identify commodity program elements that tend to discourage conservation as well as to determine the distribution of erosion problems between program participants and nonparticipants in critical erosion problem areas. One of the key findings of the study is that 41 percent of the farmers

in sample areas did not participate in either commodity or conservation programs administered by the Federal Government in FY 1982.

Other preliminary findings of the ERS consistency review indicate that--

- Roughly 40 to 65 million acres of cropland eroding above tolerance levels are operated by participants in USDA commodity or conservation programs or both.

- Between 75 and 110 million acres of cropland eroding above tolerance levels are operated by individuals participating in neither commodity nor conservation programs of USDA.

It appears that between one-fourth and one-half of the acres with excessive water or wind erosion could be addressed through changes in USDA commodity and conservation programs. Conservation-oriented program changes are feasible, however, only if they can be made economically and will not impair farm income or objectives for commodity prices, production, and exports.

In a given year, from 45 to 80 percent of USDA commodity program participants may maintain soil erosion at tolerable levels. Year-to-year variation in this percentage depends on program availability, provisions, and participation rates, as well as on physical and management factors affecting erosion. The intermittent nature of some commodity programs and consequential variance in program participation pose additional problems for the effectiveness of conservation-oriented program changes.

Finally, operators of one-half to three-fourths of cropland eroding above tolerance levels do not participate in USDA commodity or conservation programs. These farmers would not be directly influenced by program changes specifically designed to reduce erosion.

Conservation in America: Summary and Major Legislative Issues

Conservation problems in America have their roots in colonial times. When land was cheap and abundant, conservation seemed economically unjustified. When farmers wore out one piece of land, they simply moved on to the next. This exploitive approach continued through the nineteenth century, when increased mechanization and Federal homestead policy made it feasible to open up ever-larger areas of land to farming.

Today, most of the Nation's best lands have been developed and crop production exceeds demand. Still, farmers are bringing other lands into the cropland base, encouraged by commodity-program benefits, the increased resale value of developed cropland relative to undeveloped land, and the availability of large machinery and irrigation systems.

In the 1930's the farm-out-and-move-on philosophy bore bitter fruit in the middle of the Nation's worst economic depression. Dust storms ravaged millions of acres. Then as now, surplus production, farm debt, high costs of farming, and weak foreign markets were associated with critical soil erosion. During this period, Congress passed the first major conservation bill, the

Soil Conservation and Domestic Allotment Act. It was the policy of Congress, the Act states, to "provide permanently for the control and prevention of erosion and, thereby, to preserve natural resources...."

A few years later Congress recognized that supporting voluntary action by farmers would produce the best conservation results and uphold principles of property rights and the common good. The conservation district movement was born.

In the decades that followed, new Federal programs were directed to problems of water shortages, flooding, and pollution. Extensive research and extension programs were created to support national conservation efforts. Today the 26 USDA conservation programs operate under an annual budget of nearly $1 billion. The roles of state and local governments and of the private sector have also grown. From their early role mainly as cooperators in federally financed efforts, they have created new programs. Programs of other Federal Departments, such as projects of Interior's Bureau of Reclamation, have affected soil and water conservation. Conservation efforts have truly become interagency, intergovernmental, even international in scope.

In the 1970's, millions of acres of highly erodible lands were converted to cropland as farmers took advantage of booming foreign markets. Energy costs, other production costs, and inflation rose--but so did demand. New reports on erosion reopened a question that had largely lain dormant since the 1930's: Would America continue to be able both to feed its people and to meet the growing foreign demand? And there were other questions, never before asked by so many. Was America contaminating its water supplies? Was the reliability of these supplies endangered by overuse or misuse? Were Federal policies further wounding rather than helping to heal our natural resources?

In 1977 Congress passed the Soil and Water Resources Conservation Act (RCA). Under the RCA, the Secretary of Agriculture conducted an extensive appraisal and analysis of the Nation's nonfederal soil, water, and related resources. In consultation with state and local governments, private organizations, and the general public, the Department of Agriculture developed the National Conservation Program (NCP). The NCP's primary components were to redirect conservation efforts to national priority problems, to strengthen the Federal-state-local partnership, and to improve USDA program management and coordination.

The 1981 Agriculture and Food Act addressed many of the resource problems and opportunities identified early in the RCA process. It was the first farm bill to incorporate a significant conservation title (Title XV). Through it, debate resumed on new initiatives for and increased consistency between conservation and commodity programs. As work on the 1985 farm bill proceeds, this debate continues. Issues in this debate include the following:

- Should a conservation reserve program, based on long-term contracts with farmers, be adopted to remove fragile lands from the commodity production base of the Nation and, therefore, to serve objectives of soil conservation, environmental enhancement, and production adjustment?

  Most excessive erosion comes from relatively few acres: 84 percent of the excessive cropland erosion caused by water occurs on 9 percent of the total cropland. Experience with the Soil Bank indicates that farmers will participate in long-term set-aside programs. Combining

conservation and production-adjustment objectives in an effort focused on the most erodible cropland might significantly reduce erosion and adjust production. This combination has not been tested on a large scale.

- Would conservation progress be made by linking nonrecourse loans, deficiency payments, and other commodity-program benefits to land users' conservation activities?

  Production-adjustment programs provide significant benefits to producers, but these programs have minimal performance requirements other than not planting certain acreages. Are the program benefits great enough that producers would apply more conservation to retain them?

- Would placing appropriate conditions on eligibility for commodity programs slow the conversion of fragile lands to cropland or improve the conservation management of these croplands?

  Two years after farmers convert undeveloped land to cropland, they can establish a crop base and meet other eligibility requirements for USDA commodity programs. These actions work against the twin USDA goals of enhancing farm prices and protecting soil and water resources.

- Would a program of providing matching grants increase the efforts by state governments to solve critical soil and water conservation problems?

  The commitment of county and state funds to the soil and water conservation effort has gradually increased, but fiscal constraints have kept Federal funds from increasing in real terms. Recent experience indicates that a modest matching grants program might further increase nonfederal efforts without causing a major increase in Federal outlays.

Traditionally, farm bills have focused almost entirely on commodity programs. But conservation problems and commodity problems are linked today much as they were in the 1930's. Demand is low; credit and debt are high. Prices received for farm products are low relative to the cost of producing them--but high relative to world market prices. Concern about natural resources is once again at a historic level.

Today, conservation needs, agricultural surpluses, and an unstable economic climate are again conjoined. Through the 1985 farm bill Congress can comprehensively address all three of these major problems in the farm sector.

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