# THE DEVELOPMENT OF THE SOIL CONSERVATION TECHNICAL PROGRAM IN THE UNITED STATES

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## ABSTRACT

### THE DEVELOPMENT OF THE SOIL CONSERVATION TECHNICAL PROGRAM IN THE UNITED STATES

by Glen D. Weber

The purpose of this study was to prepare a concise, objective description and analysis of the soil conservation technical program in the United States by its chronological development.

Initial impetus was given to the soil conservation program by an evangelist and politician, Hugh Hammond Bennett. Bennett directed the soil conservation basic research program, which attempted to determine the basic relationships involved in the erosion process. From this start, several stimuli have carried the soil conservation program to where it is today.

First, the depression of the early 1930's caused widespread unemployment and resulted in the use of excess labor to apply conservation practices by some government agencies. This gave soil conservation a foothold in the United States.

As the nation recovered from the depression, spectacular dust storms swept across the country. These dust storms, preceded by a severe drouth, dramatically ilustrated the result of improper use of land by man. The storms, nationwide in effect, pointed to the need for a national program

of soil conservation.

World War II was the next event to invigorate the soil conservation program. "Increased production through conservation" was the battle cry during this period. During the war soil conservation districts, developed earlier to spread soil conservation to all areas, had their greatest growth period.

The most recent stimulus observed was the series of great floods from 1948-1952. Greater damage from floods resulted from man's increasing use of river flood plains. Watershed management programs were primarily a response to the need to provide downstream areas with more protection from floodwaters and sediment.

Urban soil conservation problems are expected to gain in importance in the future. Large increases in the population and size of urban areas have brought about a greater demand for water and a greater need for a knowledge of soils. More emphasis will be needed on these problems of water resources and urban areas. However, the future soil conservation program in this country will continue to be primarily an agricultural program.

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# CHAPTER I

## INTRODUCTION

"Conservation" is a term of many meanings. Its connotations are so diverse that the term should be defined before usage. Conservation differs from preservation in that the preceding term implies usage. Conservation is concerned with the use of resources, and more specifically, with the when of resource use.[1] It re-distributes resource use in the direction of the future.[2] For the purpose of this paper, soil conservation may be defined as being the wise use of soil resources over time.[3]

The original objective of soil conservation was to stop or reduce the physical loss of soil. It is generally accepted that all erosion can not be prevented. Economic principles preclude the stopping of all geologic erosion. Soil conservation is concerned with reducing accelerated erosion, which exceeds the normal geologic rate because of man's activity. Soil erosion can be described as being the detachment and transfer of soil particles by water and wind.

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[1] S. V. Ciriacy-Wantrup, Resource Conservation (Berkeley: University of California Press, 1952), p. 51.

[2] Ibid.

[3] Raleigh Barlowe, Land Resource Economics (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1958), p. 284.

Another term that is used frequently in this study and in other literature is the "soil conservation movement." This term refers to the series of events and actions which led to the increasing acceptance and popularity of soil conservation in this country. The soil conservation program has experienced a steady growth since its inception in the early 1930's.

At present the soil conservation program is the major program in the United States Department of Agriculture, based on appropriations. Of the Department of Agriculture's 1960 appropriations, more than 55% went to the various phases of the soil conservation program. (Table 1)

Table 1.--Federal Appropriations for the Soil Conservation Program - 1960[a]

| | Appropriation | % of U.S.D.A. Appropriation |
|---|---|---|
| Soil Conservation Service | $133,147,000 | 10.36 |
| Agricultural Conservation Program | 241,500,000 | 18.78 |
| Conservation Reserve Program[b] | 335,000,000 | 26.05 |
| TOTAL - SOIL CONSERVATION | 709,647,000 | 55.19 |
| TOTAL APPROPRIATION - U.S.D.A. | $1,285,721,638[c] | |

[a]Department of Agriculture Appropriations for 1961, Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 86th Congress, 2nd Session, Part 1, p. 2.

[b]This figure was listed as a part of the appropriation for the Commodity Stabilization Service.

[c]This figure represents the total appropriation for the regular activities of the Department of Agriculture.

More than $700,000,000 in Federal money was poured into the soil conservation program in 1960. Additional funds went into soil conservation research. The Soil Conservation Service employed 16,000 permanent employees the same year. More than 14,000 lay leaders (district directors) managed the affairs of 2849 soil conservation districts. These districts covered 87% of the area of the forty-eight original states.[4] Soil conservation is indeed big business in the United States.

Several financial assistance programs have been established to encourage farmers to apply soil conservation practices and to make land-use adjustments in the interest of conservation. These programs have probably played a very important role in the increasing acceptance of soil conservation.

The Agricultural Conservation Program offers cost-sharing on land-use adjustments and on the application of conservation measures. The Conservation Reserve part of the Soil Bank Program attempted to obtain a longer lasting shift of crops to conservation uses.[5] The Farmers Home Administration offers loans for soil and water conservation to farmers. Each program has given the farmer a greater incentive to practice soil conservation.

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[4]U.S.D.A., Soil Conservation Service, Statistical Report on Soil Conservation Districts for Fiscal Year ending June 30, 1960, 11 pp. (unpublished).

[5]Virgil D. Gilman, James M. Hunt, and D. Harper Simms, "Where Farmers Can Get the Help They Need," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), p. 327.

The appeal and growth of the soil conservation program has resulted in a considerable amount of inter-agency bickering as to who should administer the various aspects of the program. Power struggles have been quite common over the period of existence of the Soil Conservation Service. Most of these struggles have been with older government agencies operating in the same general area as the Service. These agencies resented sharing their domain with a new agency. The Soil Conservation Service's best known disputes have occurred with the Cooperative Extension Service, the Tennessee Valley Authority, and the Army Corps of Engineers.

The Extension Service naturally resented the presence of the Soil Conservation Service. The SCS would have direct contact with the farmers, heretofore an exclusive right of the Extension Service. The SCS would also be offering concrete services in an appealing program. This program, although stressing technical assistance rather than education, was similar enough to the Extension program to cause active opposition from some Extension offices.

A similar power struggle developed in the Tennessee Valley. This match pitted the SCS against the Tennessee Valley Authority and the land-grant colleges of the Valley. The reason for opposition to the SCS program was basically the same: existing agencies resented having competition. Because of the strength of their program, the TVA-college alliance was able to limit the entrance of the SCS into the

Valley until 1950-1951.[6]

Major disagreements with the Army Corps of Engineers began shortly after the Second World War when the SCS entered the dam-construction field. The Corps had always been the dam-construction agency and quickly began to criticize the dams built by the SCS. When a Service program of watershed protection and flood prevention (P. L. 566) went before Congress, the Corps, although not successful in stopping the program, succeeded in strangling the program with red tape and procedures. However, the interests of the SCS were served by an amendment to the law passed two years later in 1956. This amendment succeeded in cutting out some of the red tape.

The mere fact that the Soil Conservation Service has survived these struggles and can still draw $130,000,000 for an annual appropriation testifies to the strength of this agency. In its various struggles, the Service has profited by its relationship to soil conservation districts. The National Association of Soil Conservation Districts has often given active support to the SCS program in Congressional hearings.[7]

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[6]Charles M. Hardin, The Politics of Agriculture (Glencoe, Illinois: The Free Press, 1952), p. 31.

[7]Ibid., p. 89.

# CHAPTER II

## THE DEVELOPMENT OF THE SOIL CONSERVATION BASIC RESEARCH PROGRAM

There has long been an awareness of the need to conserve the soil resources of the United States. Since the 1770's, when George Washington and Thomas Jefferson adopted soil conservation measures on their Virginia farms, there have nearly always been a few scattered individuals who recognized the effects of soil erosion.

The effect of these individuals in their campaign against soil deterioration was not great. Operating in a nation noted for its abundance of resources, these crusaders were little more than voices in a wilderness. Rather than utilize soil conservation practices, most farmers would cultivate a farm until it "wore out," then move on to a new area. There was always more land to the west on which to start over.

Around the beginning of the Twentieth Century, the harmful effects of resource exploitation became recognized. The conservation era began with the move to conserve the nation's forests. Gifford Pinchot and Theodore Roosevelt led this campaign to preserve our forests against the ravages of fire and the lumber baron's axe. It should be noted that preservation, not conservation, was the aim of this movement.

The exhaustibility of our soil resources was not generally recognized at this early date. As Milton Whitney, Chief of the Bureau of Soils, said in 1909, "The soil is the one indestructible, immutable asset that the Nation possesses. It is the one resource that cannot be exhausted; that cannot be used up."[1] This statement caused many red faces to Bureau employees in later years.

It was only two years after Whitney's statement that President Taft pointed out the need for erosion control in the United States.[2] Unfortunately, no significant action resulted from the President's statement. Taft was primarily concerned with the possibility that American agriculture would not be able to produce enough food for the rapidly increasing population. Control of erosion was considered as a means of increasing food production.

Probably the first good erosion research in the United States occurred during this period. In 1914 G. K. Gilbert wrote his classic paper which dealt with the movement of sediment by running water.[3] However, this paper concerned only the movement of sediment within channels. The process

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[1]Milton Whitney, Soils of the United States, United States Department of Agriculture, Bureau of Soils, Bulletin No. 55 (Washington: Government Printing Office, 1909), p. 66.

[2]William Howard Taft, Conservation of the Soil, United States Department of Agriculture, Office of the Secretary, Circular #38 (Washington: Government Printing Office, 1911).

[3]G. K. Gilbert, The Transportation of Debris by Running Water, U.S. Geological Survey, Professional Paper 86 (Washington: Government Printing Office, 1914).

of sheet erosion was not generally understood at this time. In 1917 the Missouri Agricultural Experiment Station began experiments which appear to have been "... the first systematic inquiry into the problem of surface runoff and the factors making for water erosion of soil."[4]

Hugh Bennett, who began to survey soils in 1903 in the Bureau of Soils, tried to arouse interest in the deterioration of the country's soil resources. For twenty-five years he was unsuccessful in this effort. Then, with the publication of Soil Erosion a National Menace[5] in 1928, some people began to get concerned about this great waste.

Among those influenced by this publication and similar educational efforts was Congressman James P. Buchanan of Texas. Congressman Buchanan succeeded in having an amendment added to the Agricultural Appropriations Bill for fiscal year 1930. The Buchanan Amendment appropriated $160,000 for soil erosion investigations to be conducted by the Bureau of Chemistry and Soils. Bennett was selected to direct these investigations.

With the appropriated money Bennett set up soil erosion experiment stations to study the process of erosion and

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[4]Austin Earle Burges, Soil Erosion Control (Atlanta, Georgia: Turner E. Smith and Company, 1936), pp. 44-45.

[5]H. H. Bennett, Soil Erosion a National Menace, U.S. Department of Agriculture Circular No. 33, 1928.

rates of erosion under different conditions.[6] Methods of erosion prevention and control were also studied. This basic research program was carried on in cooperation with the state agricultural experiment stations. The erosion stations were located in strategic areas typical of a large region and were operated for about ten years. Much of the erosion research was done on runoff plots of about one-hundredth of an acre in size.

An example of the type of information accumulated is found in the report of the Clarinda, Iowa station.[7] Four factors were found to affect the rate of erosion:

1. Rainfall amount, intensity and duration
2. Slope length and degree
3. Vegetation type and amount
4. Soil

Other problems of importance in this area were the one-year tenancy system, the large proportion of mortgaged land, and the large capital investment required.

This basic information was put to work by the erosion experiment stations. From it, techniques of erosion

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[6]These erosion experiment stations were located at Pullman, Washington; Hays, Kansas; Tyler, Texas; Temple, Texas; Guthrie, Oklahoma; Bethany, Missouri; Clarinda, Iowa; LaCrosse, Wisconsin; Zanesville, Ohio; Statesville, North Carolina; State College, Pennsylvania; Ithaca, New York; and Mexican Springs, New Mexico.

[7]G. M. Browning et. al., Investigation in Erosion Control and the Reclamation of Eroded Land at the Missouri Valley Loess Conservation Experiment Station, Clarinda, Iowa, 1931-1942, U.S. Department of Agriculture, Technical Bulletin 959 (Washington: Government Printing Office, 1948).

prevention and control were developed. Such soil conservation practices as strip cropping and grassed waterways were developed and refined from the results of this basic research.[8] These practices were quickly carried to the field and, after considerable educational and promotional effort, they were put into practice.

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[8]David Cushman Coyle, Conservation (New Brunswick, New Jersey: Rutgers University Press, 1957), p. 119.

# CHAPTER III

## THE WATERSHED DEMONSTRATION PROJECTS

The depression of the early 1930's severely impaired the economy of the United States. As a part of the New Deal's program for recovery, the National Industrial Recovery Act was passed. Under his authority derived from this act, President Franklin D. Roosevelt established the Soil Erosion Service in the Department of the Interior in late 1933. The dual purposes of this new agency were to provide work relief and to conserve the soil. Hugh Bennett was selected to direct the work of the Soil Erosion Service.

The availability of labor from the Civilian Conservation Corps created a great potential for development of the soil conservation program. A new approach was needed to carry this idea of soil conservation to the farmers. This method would also have to make good use of relief labor. It was decided to use soil and water conservation demonstration projects on private land as this new approach. This was the beginning of the mass application phase of the soil conservation movement.

The purpose of the demonstration projects was "... to introduce conservation measures and practices applicable to a large natural land-use region by using a small watershed

area that represented as nearly as possible a cross section of the region."[1] The direct effects of this program were not expected to solve the soil and water problems of the watershed. The demonstration program attempted only to point the way toward a possible solution. Getting the conservation practices applied on private farms would often make these practices more acceptable to the neighbors. It should be remembered that soil conservation farming was a new concept at this time and had to be "proven" before many farmers would accept it.

The Coon Creek Erosion Control Demonstration Project is a good example of the demonstration program. The Coon Creek Watershed is located in southwestern Wisconsin and covers an area of 90,000 acres in three counties. This project, established in late 1933, was "the first large scale soil and water conservation demonstration ever carried out by man."[2] This watershed was a good choice for a soil conservation demonstration because it is an area in which the soils are erosive and the farmers recognized this problem and were ready to do something about it.

The soil conservation program was carried out almost entirely within the demonstration projects at this time. The Soil Erosion Service offered the farmer a five-year plan, to

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[1]W. Robert Parks, Soil Conservation Districts in Action (Ames, Iowa: The Iowa State College Press, 1952), p. 4.

[2]H. H. Bennett as quoted by H. O. Henderson and I. O. Hembre in "The Coon Valley Watershed Project," Journal of Soil and Water Conservation, Vol. 10, No. 4 (July 1955), p. 180.

be worked out cooperatively. If the farmer agreed to carry out the conservation plan the technician developed with him, the federal government agreed to furnish lime, seed, fertilizer, fencing, labor (C.C.C.), and technical assistance.[3] The value of these services to the farmers can be readily appreciated. The federal government was offering a great incentive for farmers in the demonstration watersheds to adopt soil conservation practices.

A closer look should be taken at the Civilian Conservation Corps, one of the most important aspects of the soil conservation program from 1933 to 1942. The CCC was established in 1933 to cope with the widespread unemployment problem of that time. Some 2,500,000 young men worked for the Corps during its span of existence.[4] Some of their tasks were: planting trees and shrubs, building structures to protect stream banks, collecting plant materials for soil conservation nurseries, construction of dams and terraces, fighting forest fires, rescue work during floods, and assisting with gully control operations.[5]

At the peak, there were more than 500 CCC camps. This illustrates the scope of this program. Instead of whiling away their time on city streets, enrollees in the CCC program were providing a valuable service for their country. Not the

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[3] Ibid., p. 182.

[4] C. S. Marsh, "The Future of the CCC," Conservation May-June 1940, p. 7.

[5] H. H. Bennett, Soil Conservation (New York: McGraw-Hill Book Company, Inc., 1939), p. 321.

least of the benefits was self-betterment, as the enrollees were able to gain a better appreciation of nature through this outdoor experience. This was a program of human conservation as well as resource conservation. It is highly likely that this concept of youth employment in conservation work will again be utilized if a serious unemployment situation ever occurs in this country again.

Conservation of soil resources was made a part of the permanent policy of the federal government in 1935. The Soil Erosion Service of the Department of the Interior was transferred to the Department of Agriculture and renamed the Soil Conservation Service. The Soil Conservation Act (Public No. 46, 74th Congress) established the Soil Conservation Service as a permanent agency on April 27, 1935.

The SCS had three primary functions in 1935: research on the erosion experiment stations, employment of relief labor, and the management of the watershed demonstration projects. There were 44 demonstration projects covering more than 4,000,000 acres as of June 30, 1935.[6] A peak of around 175 demonstration projects was reached about three years later.[7] The SCS discontinued the practice of providing lime, fertilizer, seed, and fencing to farmers within the demonstrations projects. Technical assistance was still

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[6]Soil Conservation Service, Report of the Chief of the Soil Conservation Service, 1935, p. 12.

[7]H. D. Abbott, "C.C.C. Operations," Soil Conservation, (March 1938), p. 237.

available and relief labor was provided in certain areas.

The demonstration project approach began to wane about 1938. This program continued to decline until 1943, when it was terminated, primarily due to the labor shortage resulting from the defense effort. The decision to de-emphasize the demonstration approach came shortly after the Soil Conservation Service was established. An inter-bureau committee in the Department of Agriculture was set up to develop a method of administering the new authority created in the Soil Conservation Act.

It was generally accepted at this time that the watershed demonstration projects were not getting enough conservation work on the land. A new approach was needed that would enable all farmers to participate in the soil conservation program. The demonstration program had shown what could be done, but it had limited the participants to those farming within the selected watersheds. The new concept developed through the deliberations of the inter-bureau committee was that of the soil conservation district.[8]

Before examining more closely the development of the soil conservation district program, another phenomenon should be studied. The drouth and accompanying dust storms of 1934-1936 had a pronounced effect on all subsequent conservation programs.

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[8]Raymond W. Heinen, "Technical Assistance for Landsmen," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), p. 329.

## CHAPTER IV

## THE DUST STORMS AND DROUTHS OF THE 1930'S

The dust storms of the 1930's were one of the most spectacular illustrations of man's improper use of soil resources ever to occur in the United States. Although the Great Plains was the source of most of the dust, much of the entire country was affected by these phenomena.

The drouth period between 1930 and 1936 was probably the most extensive and severe such period ever to occur in this country since its settlement.[1] Although the humid areas were also greatly affected by this prolonged drouth, this study is concerned primarily with the semi-arid Great Plains.

Severe drouths occurred in the semi-arid states in 1931, 1933, and 1934. To top this off, the worst drouth year ever recorded (based on precipitation deficiency and area affected) followed in 1936.[2] Throughout the drouth, water became more and more scarce and vegetation became more sparse. Much of the vegetation that survived was shorn off by the blowing sand particles or grazed off by livestock.

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[1] William G. Hoyt, "Droughts," Hydrology, ed. O. E. Meinzer (New York: Dover Publications, Inc., 1942), p. 585.

[2] Ibid., p. 589.

For many operators there was a choice of either letting the cattle graze off the remaining scrub vegetation or sending the cattle to market for whatever price they would bring.

The first great dust storm occurred on May 12, 1934. Dust clouds originating in Kansas, Oklahoma, Texas, and Colorado crossed two-thirds of the continent to the eastern coast. The dust darkened the sun and permeated the smallest apertures of houses and other buildings. Stories of cars, farm machinery, and buildings being covered with sand were common at this time. It should be recognized that damage by sand was only local, that is, near the original source of the material. Silt and clay particles were capable of being carried longer distances, often thousands of miles, before being deposited.

The story of the Dust Bowl is one of tragedy and hardship. As Henderson wrote at that time, the drifting soil "... fills the air and our eyes and noses and throats, and, worst of all, our furrows, where tender shoots are coming to the surface only to be buried by the smothering silt from the fields of rugged individualists who persist in their right to do nothing."[3] This passage points out another enemy that residents of the area had to combat: the apathy of speculators and non-resident owners who invested in the land only to harvest the returns of the occasional bumper crop.

The effect of the dust storms on the Great Plains was

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[3]Caroline A. Henderson, "Letters from the Dust Bowl," Atlantic Monthly, (May, 1936), p. 542.

tremendous. Farms and business enterprises were lost for failure to pay back taxes. Many families were put on relief; others moved to other parts of the country. Great losses occurred in both human and soil resources. As Stuart Chase said, the American people were sitting on their porches watching their continent go by.[4]

Physical loss and degradation of agricultural and grazing lands were not the least of the harmful effects of the dust storms. In 1935, Fortune magazine reported that 9,000,000 Great Plains acres had been ruined by the wind.[5] It is doubtful if these 9,000,000 acres were totally ruined, by any means. It is more likely that they were reduced in value and capability, but not permanently ruined.

These losses of soil resources were quite serious. However, remedial measures were not undertaken until the situation was critical. Then, there was little that could be done without moisture to establish vegetation. Moisture was then the key to all life. It was needed to establish vegetation, to hold the soil, to water stock, and to build up ground water levels for human use.

A number of inter-related factors combined to "trigger off" the development of the dust storms. First of all, it should be realized that the native vegetation of most of Great Plains was grass -- tall grass in the more humid

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[4]Stuart Chase, Rich Land, Poor Land (New York: McGraw-Hill, 1936), p. 3.

[5]"The Grasslands," Fortune, November 1935, p. 59.

sections and short grass in the drier areas. This indigenous grass had adapted itself to the prevailing climate, topography, and soils over many centuries of time. It was in equilibrium with its environment. Grass was the climax vegetation of the area.

When white man came to the Great Plains, he destroyed the balance between vegetation and environment. First he brought in cattle to graze the Plains. Then he brought sheep in to crop it even shorter. Next came the railroad to bring in more people and livestock. Last, and probably the most harmful of all, came the plow.

For a few years after breaking the Great Plains sod, yields were good and wind erosion was negligible. These conditions brought more farmers and speculators to the area to tear up more sod and plant more cash crops. Cash crops do, of course, demand more water and give less protection to the soil as compared to the native vegetation. When the crop failed, there was almost nothing left to protect the soil from the wind. And the Great Plains has the highest average wind velocity of any area in the interior of the country.[6] The incessant winds wore away the remaining vegetation, then began to carry away the soil.

The Great Plains is at best a marginal crop production area. The chief limitation is the light and unreliable rainfall. As Solberg says, "A precipitation of about 20 inches

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[6]H. H. Bennett, Soil Conservation (New York: McGraw-Hill, 1939), p. 729.

a year, the longtime average in the area [Great Plains], is considered the minimum for growing crops without irrigation."[7] If the average precipitation is also the minimum for crop production, then the frequency of crop failure will be great. Crop failures lead to insufficient plant cover, then soil blowing commences.

Blowing dust should be viewed as a symptom and a symbol, rather than a direct problem in itself. As Kellogg stated,

> "Generally, erosion is one of the symptoms of some deep maladjustments between the soil and the farming system. Rarely can we achieve control by simple direct means; rather we must get back of the immediate symptoms and find the cause. Frequently we find weak plant cover and declining soil fertility resulting from unstable economic conditions, bad tenure relationship, overcrowded land, poverty, disease, and wars ...."[8]

Soon it became apparent that the only way to control the dust storms was to bring back the grass. It was very difficult to persuade farmers to seed their acres to grass. Grassland agriculture is less intensive and often less profitable than growing cash crops. Rather than shift down to a lower use, many farmers preferred to gamble on getting the occasional bumper crop.

Another problem is accomplishing this shift back to grass was the rate of turnover on Great Plains farms. There

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[7]Erling D. Solberg, "Planning for Stability in a Great Area," Land the 1958 Yearbook of Agriculture, (Washington: Government Printing Office, 1958), p. 532.

[8]Charles E. Kellogg as quoted by Charles M. Hardin, The Politics of Agriculture (Glencoe, Illinois: The Free Press, 1952), p. 239.

was a high rate of turnover for both owners and operators on these farms. This meant that most operators were planning on a short-term basis. Short-term planning is not usually conducive to the conservation of soil resources. The high rate of operator turnover also meant that accumulated knowledge from one drouth might not be available for use during the next drouth. Techniques developed by one operator would have to be re-discovered by later operators.

The Soil Conservation Service quickly recognized the unique soil and water problems of the Great Plains and took steps to solve these problems. Five of the thirteen original erosion research stations were located on the Great Plains. Demonstration projects were used to illustrate and encourage the use of proper farming techniques that would reduce or prevent soil blowing. Later, when the less spectacular but equally damaging drouth of the 1950's occurred, the federal government provided assistance specifically to the Great Plains.

The Great Plains Conservation Program (P. L. 1021, 84th Congress) was approved in August of 1956. This program provides "both cost-sharing and technical assistance for farmers and ranchers in designated counties of the ten Great Plains States to help them undertake long time adjustments planned to meet the climatic hazards of the area."[9]

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[9]Virgil D. Gilman, James M. Hunt, and D. Harper Simms, "Where Farmers Can Get the Help They Need," Land the 1958 Yearbook of Agriculture, (Washington: Government Printing Office, 1958), p. 327.

Authorizations are limited in total amount and to individual farmers. The Soil Conservation Service has been assigned the responsibility of administering the Great Plains Conservation Program. Seldom has such a program been set up on a regional basis, as this program was.

The federal government has taken definite steps to prevent a reoccurrence of the dust storms of the 1930's. The Great Plains contain valuable agricultural resources, but they must be carefully managed to maintain their worth. As Paul Sears said, these great grasslands are "the strategic buffer between civilization and the desert."[10]

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[10]Paul B. Sears, Deserts on the March (New York: Simon and Schuster, 1937), p. 120.

# CHAPTER V

## THE SOIL CONSERVATION DISTRICT PROGRAM

As discussed earlier, an inter-bureau committee in the Department of Agriculture was established to develop means of administering the authority created by the Soil Conservation Act of 1935 (P.L. 46). The soil conservation district concept was devised in answer to this need. The committee recommended that all Soil Conservation Service erosion control work on and after July 1, 1937 be handled through legally constituted soil conservation associations (later named districts). Before that time, such work was to be handled through either legally constituted or voluntary soil conservation associations.

During the intervening two-year period before state enabling acts were passed, many voluntary soil conservation associations were formed. Most of the voluntary associations were established in conjunction with the watershed demonstration projects. The State Extension Services and the Soil Conservation Service were responsible for the organization of these associations. Apparently the primary function of the associations was the dissemination of erosion control information, although some associations purchased machinery and

equipment to encourage the application of practices.[1]

To encourage the adoption of uniform state enabling laws, the Department of Agriculture prepared "A Standard State Soil Conservation Districts Law" in 1936.[2] This suggested act authorized the organization and operation of districts and outlined their functions, powers, and organizational arrangements. President Roosevelt submitted a copy of the standard act to the governor of each state and urged them to consider a similar law for their state.

So, not only did the federal government conceive the idea of soil conservation districts, but federal pressure was applied on the states to adopt enabling legislation. Another type of federal pressure is described by Parks. "In the early days of the district program, [Soil Conservation] Service workers took an aggressive part in drumming up farmer interest in conservation so that a favorable farmer referendum on the organization of a district might be secured."[3] Hardin corroborates the fact that districts have not been produced by spontaneous combustion.[4] The federal government is

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[1]J. Phil Campbell, "Associations Lay Groundwork for Legally-Constituted Districts," Soil Conservation, (November 1937), p. 132.

[2]U.S. Department of Agriculture, Soil Conservation Service, A Standard State Soil Conservation Districts Law (Washington: U.S. Government Printing Office, 1936).

[3]W. Robert Parks, "Effort to Synthesize National Programming with Local Administration in Soil Conservation Districts" (unpublished Ph.D. dissertation, Department of Political Science, University of Wisconsin, 1948), pp. 207-208.

[4]Charles M. Hardin, The Politics of Agriculture (Glencoe, Illinois: The Free Press, 1952), p. 71.

largely responsible for the existence of soil conservation districts.

Twenty-two states enacted enabling laws the first year (1937). By 1947 soil conservation district laws had been enacted by all forty-eight states, Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Each state, however, made at least slight modification in the standard act before adoption.[5] A few states added powers, such as taxation and eminent domain, that were not included in the standard act.

The most controversial part of the standard act was that part dealing with compulsory land-use regulations. The standard act suggested that districts be provided with the power to regulate the use of land in the district in the interest of conserving soil and controlling erosion. Before going into effect, the regulations developed by the district board had to be accepted by a simple majority of the land occupiers at a referendum. These regulations could take the form of requiring necessary engineering operations, requiring particular methods of cultivation, specification of cropping programs and tillage practices, or requiring the retirement from cultivation of areas that are highly erosive when cultivated.[6]

Authority to regulate land-use is denied the districts of sixteen states (as of 1952).[7] Of the remaining thirty-two

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[5]Parks, op. cit., pp. 18-25.

[6]U.S.D.A., Standard Districts Law, pp. 19-20.

[7]Material in this paragraph is taken from Soil Conservation Districts in Action, by Parks, pp. 147-153.

The district approach to soil conservation utilizes an intergovernmental mechanism which attempts to combine national programing with local determination.

It should be recognized that districts often cooperate with agencies other than the Soil Conservation Service. Federal or state agencies may be called upon to give assistance to the district program. The Forest Service, Extension Services, Fish and Game agencies, and Vocational Agriculture personnel are examples of additional assistance that is often available. In some cases districts may form cooperative agreements with industrial or other private groups.

Soil conservation districts are administered by a board of five directors (also called supervisors or commissioners in some states). Directors are usually local farmers elected to these non-paying positions at the district's annual meeting. In some states the state soil conservation committee appoints two of the five local farmers to the district board. The state committee was, however, established to facilitate the development of the district program rather than to function as a control agency.

The standard districts law suggested that district operations be financed by appropriations from the state treasury.[10] It was thought that it would be unwise to grant the districts the power of taxation or the power to borrow money by selling bonds. Accordingly, districts in most states

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[10]U.S.D.A., Standard Districts Law, pp. 28-29.

rely upon state appropriations to cover the majority of their operating expenses. Expenses may be incurred through several types of district operations, such as conducting demonstrational projects, using and transferring property, purchasing and maintaining machinery and equipment, operation of plant nurseries, and carrying on educational programs.

With the federal government providing the stimulus, the soil conservation district "movement" began in 1937. To help this movement get a better start, an extensive educational program was instituted by the Department of Agriculture. The purpose of this program was to create a greater awareness of the effects and the extent of soil erosion in this country. Methods of erosion control utilized by the Soil Conservation Service were also stressed.

Many of the materials written for this educational program were similar in content and approach. These articles usually relied on a reconnaissance survey that had been made by the Soil Erosion Service in 1934.[11] This survey indicated that millions of acres of cropland had been made useless by soil erosion. It was said that more than a billion acres of agricultural land was damaged so some extent by erosion. Accurate or not, these figures must have awakened many people to the presence of a serious problem.

Effective use of photography was characteristic of these educational publications. Gaping gullies and scarred

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[11]H. H. Bennett, Soil Conservation (New York: McGraw-Hill Book Company, 1939), pp. 8-9.

landscapes were pictured on many of the pages.[12] The result was a bleak, desolate picture of what misuse by man could do to the land. This was a scare technique used to dramatize the ravages of erosion and to get people concerned about this problem of society.

During this educational campaign, the Soil Conservation Service began to promote the formation of soil conservation districts.[13] The need for cooperation and community action in solving problems of erosion control was pointed out. The possibility of using land use regulations was often stressed. The SCS was encouraging the use of regulations at this time. Another alternative that the Service was encouraging at this time was the formation of districts along watershed or natural land-use boundaries. The Service failed in both of these endeavors.

The Department of Agriculture's educational campaign helped the soil conservation district to become established and accepted in rural America. From this start, soil conservation districts steadily increased in number and area covered.[14] (See Figures 1 and 2). The peak period for

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[12]C. F. Stewart Sharpe, What Is Soil Erosion?, U.S.D.A. Miscellaneous Publication No. 286 (Washington: Government Printing Office, 1938).

[13]U.S.D.A., Soil Conservation Service, Soil Conservation Districts for Erosion Control, Miscellaneous Publication No. 293 (Washington: Government Printing Office, 1937).

[14]U.S.D.A., Soil Conservation Service, Statistical Report on Soil Conservation Districts for Fiscal Year ending June 30, 1960, 11 pp. (unpublished).

Figure 1. Number of soil conservation districts formed each year.

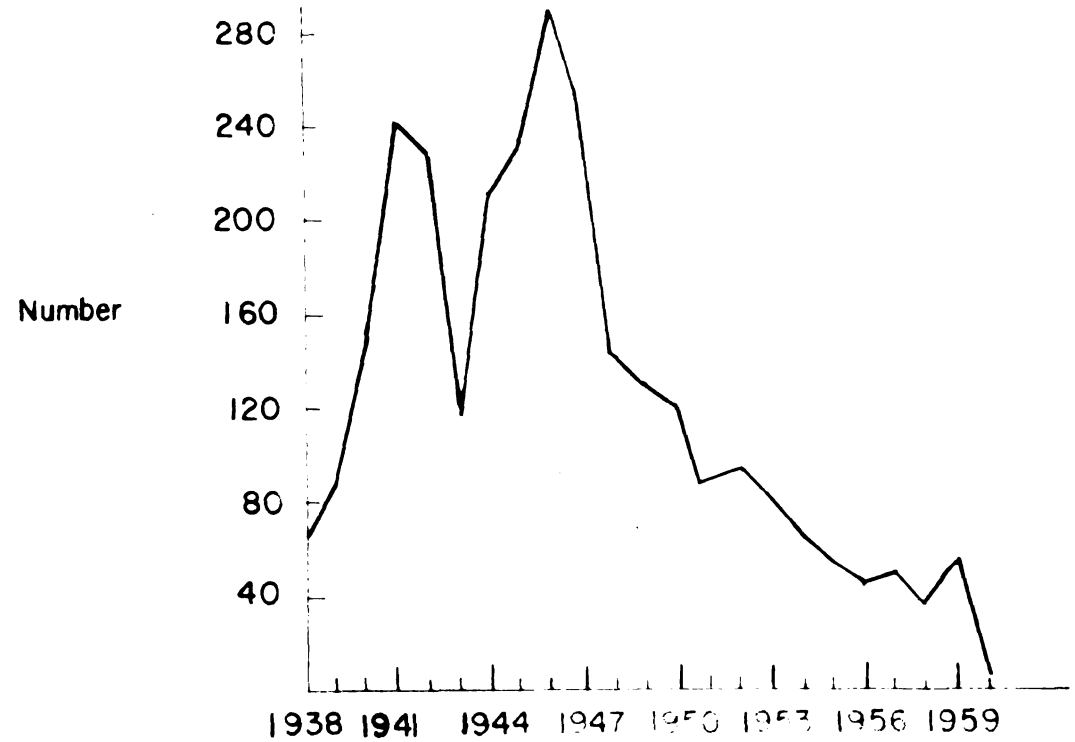
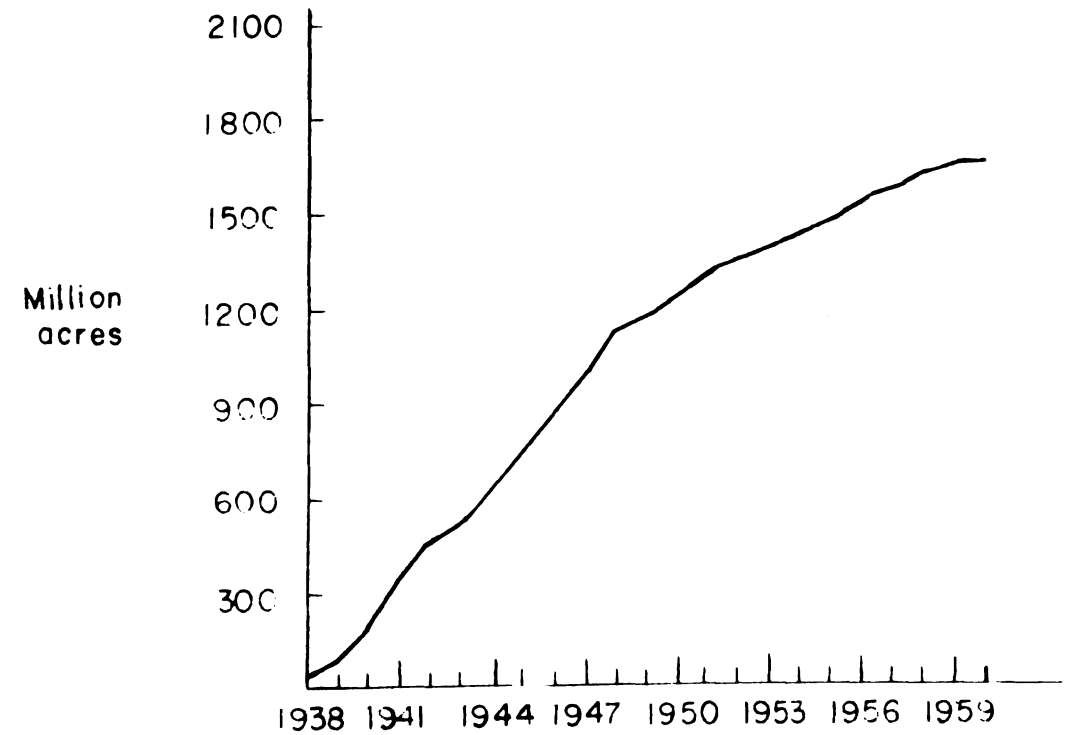



Figure 2. Area in soil conservation districts - cumulative.



district formation was during the years of World War II. Nearly half of the present number of districts were organized during the period of 1941-1946. Following this period, there has been a steady decline in the formation of new districts. The area in soil conservation districts has now fairly well leveled off.

Soil conservation districts covered 87.3% of the area of the United States as of June 30, 1960.[15] In the 2849 districts of the fifty states, there were more than 1,800,000 cooperators controlling more than 570,000,000 acres. Nearly 1,300,000 basic plans had been developed covering 378,000,000 acres. The part of the conservation job already accomplished is sizeable.

Although these statistics may be quite impressive, the question arises as to what could or should have been done at this stage in the development of soil conservation districts. Has the district mechanism matured into the form it was expected to take? In their close relationship, has either the SCS or the districts overstepped their area of responsibility and entered the domain of the other? Because of this close relationship, it is difficult to find SCS literature that is critical of districts. What appear to be objective studies of the district program have been presented by Charles

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[15]This figure was calculated from the preceding statistical report. Only the forty-eight original states were included, the purpose of which was to eliminate the distortion that would result if the vast wastelands of Alaska were included.

M. Hardin and W. Robert Parks.

A very basic question is asked by Hardin as to the appropriateness of the objective of soil conservation.[16] The original goal of soil conservation was to overcome the erosion menace. Now the objective is to use each acre within its capabilities and treat it according to its needs for protection and improvement. This expanded goal, in short, means that soil conservation is little more than a good soil management program. However, the focus of concern is still on the soil, rather than on the humans who are making their living from the soil.

Hardin suggests that the soil conservation objective might be more sociologically oriented. A goal such as "the improvement of farm family living" might be more desirable.[17] A more sociologically oriented soil conservation program would then be concerned with more than physical erosion of the soil. It would encompass such areas as tenure conditions, availability of credit from private and public sources, and consideration of individual wants and desires. It would treat the disease rather than the symptoms. However, the administration of such a program would almost certainly be beyond the ability of the SCS - district combination.

Another observation made by Hardin in regard to districts is that the elected director seems to have very little

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[16]Charles M. Hardin, "Land or People?" Land Economics, Vol. XXVII (May, 1951), p. 134.

[17]Ibid.

to do.[18] One reason for this is that the scientific approach used by the Service discourages "meddling by laymen."[19] It is natural for the farmer director to shift the work load to the technically-trained Service employee. The technician is a full-time paid worker in soil conservation. He is anxious to impress his administrative superiors with accomplishments in the soil conservation program. The farmer director, on the other hand, is usually fully occupied with farming and is not as experienced in the scientific aspects of soil conservation.[20]

There are, of course, many active district boards that carry their share of the responsibility in the soil conservation program. But what of the inactive boards that exist in districts that are all but dormant? If the district cannot be re-activated, then perhaps it should be discontinued. In this case, most, but probably not all, Service assistance would be withdrawn from the district.

A more logical step to precede termination of the district would be consolidation with a contiguous district. This would be much more acceptable to the SCS, for loss in area of districts reduces the Service's bargaining power during appropriations hearings. Thus it can be understood why "... the Service is continually attempting to goad local

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[18]Hardin, The Politics of Agriculture, p. 75.

[19]Ibid.

[20]Parks, Soil Conservation Districts in Action, p. 51.

people into participating in the district process."[21]

It should not be implied from this discussion that the district program has little potential. Districts have exerted considerable influence in the general direction of the soil conservation program. One example of this influence is the districts' failure to accept and use the land use regulation mechanism. Districts have had considerable influence in adjusting the balance between farm planning and application of practices. Directors usually outline the major areas of emphasis in the district program.

The effectiveness of the district program has been summed up by Parks. "The resulting cross-fertilization of national and local experiences promises increasingly to produce a sounder and better proportioned approach to conservation activity than if either technicians or farmers were attempting to go it alone."[22]

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[21] Ibid., p. 141.

[22] Ibid., p. 105.

## CHAPTER VI

## PROGRAM CHANGES DURING WORLD WAR II

World War II brought about changes in the goals and desires of the American citizenry. To defeat the enemy became the goal of our whole society. All available resources were used towards the attainment of this goal. Since the pre-war soil conservation objectives and techniques did not fit into the new war-time pattern, the conservation goals were changed.

The Soil Conservation Service joined the defense effort in 1941. The aim of the SCS during the war was to increase food production while conserving the soil base. "Soil defense" was a popular term during this period. "Just as the Army and Navy defend the county in one dimension--from border to border, from shore to shore--this agency [the SCS] defends the country in another dimension--from the surface of the soil to the rocks beneath."[1] Thus it can be seen how the Service adapted its goals and standards to those of society as a whole.

"Increased production through conservation" could have been the motto of the SCS during the war. "Soil conservation has become a potent tool in the hands of the Nation's farmers who, on the home front, are waging a year-around battle of

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[1]U.S.D.A. - SCS, Report of the Chief of the SCS, 1941, p. 2.

ever-increasing importance for greater and even greater production of food, fiber, fats, and oils."[2] It was patriotic to increase food production. The Service attempted to make it equally patriotic to save the soil.

During the war a new method of promoting soil conservation work began to grow in popularity, at least in Michigan. This was the demonstration runoff plot. Before examining the operation of and value of these plots, a look should be taken at their background and reason for development.

During the soil conservation basic research program, runoff plots were used as instruments of research. The purpose of these early research runoff plots was to establish fundamental laws and principles governing surface runoff and erosion, as well as to determine factors and coefficients needed to apply these results to actual farm lands.[3] Large numbers of these plots were used in order to study how the rate of erosion was affected by such variables as slope length, degree of slope, soil aggregation, rainfall characteristics, and surface cover.

Many of the basic relationships involved in the erosion process were established through the work done on these research plots. Specific soil conservation practices

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[2] U.S.D.A. - SCS, Report of the Chief of the SCS, 1943, p. 2.

[3] Robert E. Horton, "Interpretation and Application of Runoff Plat Experiments with Reference to Soil Erosion Problems," Soil Science Society of America Proceedings, Vol. III (1938), p. 340.

were developed to be used under certain types of conditions. To illustrate to farmers the effects of conservation practices under field conditions, the demonstration runoff plot was used. Demonstration plots were primarily educational tools of soil conservation districts.

These demonstration plots are not to be confused with the research runoff plots that preceded them. "Strictly speaking, demonstration experiments are not experiments at all but oversimplified exhibits of experimentally established principles."[4] In other words, the demonstration plots were designed to exemplify the results that had already been attained from the research plots. Demonstration plots were to give visual evidence to farmers of the value of conservation farming.

Because the data from these Michigan plots has never been consolidated, it was necessary to rely upon personal communication with field workers in the local area to obtain this information. At one time or another, there have been about thirteen sets of demonstration runoff plots in Michigan. These plots are, or were, located near the following Michigan towns: Evart, Chatham, Mason, Caro, Rockford, East Jordan, Suttons Bay, Hickory Corners, Casnovia, Fenton, Stanton, Benton Harbor, and Lapeer.

Since the demonstration plots were projects of the

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[4]A. E. Brandt, "Size and Shape of Control Plots for Runoff Studies," Soil Conservation, Vol. III, No. 8 (February, 1938), p. 210.

individual soil conservation districts, there was considerable variation in the plots and the results from them. However, most of the plots were 72 feet long and six feet wide, giving each plot an area of 1/100 acre. Usually about six plots existed at each location. The six individual plots could then be used to compare different cropping practices and conservation practices. Most of the sets of plots compared up-and-down cultivation to contour tillage with row crops, small grain, and meadow.

One general deficiency of the demonstration plots was in record-keeping. Several districts apparently kept no records or misplaced the records on their plots. The records on several other plots are so inaccurate that they have no value. The only summary of plot information that can be presented herein is that which is taken from the plots having good records. It is not intended to represent these particular plots as typical; they are probably above average in quality. Table 2 summarizes the results from these demonstration plots.

Of the five plots summarized, only the Muskegon (Casnovia) and the Kellogg (Hickory Corners) plots are active at present. The Muskegon plots have been operated seventeen years; the others seven or eight years. Crop yield data, which would seem to have considerable potential value, was kept only on the Muskegon plots. Precipitation records were kept on the Muskegon, Kellogg, and Ingham (Mason) plots.

There appear to be several general rules that should

Table 2.--Average loss of soil per year - tons per acre[a]

| | Fenton | Kellogg | Muskegon | Ingham | Tuscola | AVERAGE |
|---|---|---|---|---|---|---|
| Up and Down | | | | | | |
| Row crop | 8.25 | 14.70 | 7.50 | 2.48 | 3.11 | 7.52 |
| Small grain | 3.09 | 1.65 | - | 1.46 | 1.01 | 1.86 |
| Meadow | 0.12 | 4.41[b] | - | 0.12 | 0.13 | 0.75 |
| Contour | | | | | | |
| Row crop | 1.11 | 5.87 | 3.27 | 0.21 | 1.32 | 2.65 |
| Small grain | 1.24 | 1.40 | 0.94 | 0.89 | 0.82 | 1.07 |
| Meadow | 0.10 | 3.45 | 0.01 | 0.10 | 0.12 | 0.63 |

[a]Data in this table was taken from personal communications and unpublished reports sent to the author from SCS field personnel.

[b]The fact that the Kellogg plots are located on a 16% slope of Fox sandy loam helps to explain the high soil loss from the meadow crop. It is more difficult to establish the meadow crop and this crop does not give the soil good protection until it is of fairly large size.

be followed if the demonstration runoff plots are to succeed. First, the plots should be located along a well-traveled road so they will be easily accessible to the public. Second, an average slope that local farmers put into cropland should be selected. Next, the plots should be located on a soil type that is common in the area and is cropped. Fourth, a rotation should be selected that is commonly used in the area. Lastly, the results from the plots should be publicized throughout the area.

During World War II another practice was developed to aid in the promotion of soil conservation work. This was the practice of carrying out a complete conservation plan on a farm in one day. Farm-a-Day demonstrations were first used about 1941, primarily in response to the need to expand the educational program with no increases in personnel. These

demonstrations utilized great amounts of machinery and personnel and required much planning.

The first two such farm transformations occurred in South Carolina in November, 1941.[5] Attendance at these two demonstrations totaled about 1900 persons. Demonstrations at this time attempted to speed the application of conservation practices so as to increase food production. Emphasis during these war years was put on "food for freedom." Civilian Conservation Corps labor was used on the two South Carolina demonstrations.

By 1947 the practice of remaking farms had grown to gigantic proportions. On an Ohio farm, 600 volunteers prepared a demonstration that drew a crowd of 50,000 persons.[6] Seventy-four tractors and a host of other equipment was used to renovate this farm. However, this demonstration was surpassed the following year by the remaking of a farm in Georgia.

Remaking the Georgia farm required six months of planning and more than a million dollars' worth of machinery and equipment.[7] This operation required the assistance of 700 people and drew a crowd of 60,000. Achievements included

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[5]Ernest Carnes, "Big-Scale Demonstration of Putting Soil Conservation on the Land," Soil Conservation, Vol. VII, No. 11 (May, 1942), p. 279.

[6]"Two Farms Remade Between Dawn and Dusk," Soil Conservation, Vol. XIII, No. 6 (January, 1948), p. 132.

[7]Barrington King, "Record Crowd Sees Birth of New Farm," Soil Conservation, Vol. XIV, No. 1 (August, 1948), pp. 3-5.

land clearing, fertilizer and lime application, construction of a two-acre pond, terrace construction, building fences, etc.

The practice of remaking farms apparently peaked around 1947. It was reported that about twenty such transformations were made in the Corn Belt in 1947.[8] The practice of remaking farms was seldom used after 1949.

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[8]"Two Farms Remade Between Dawn and Dusk," op. cit., p. 132.

# CHAPTER VII

## PROGRAMS OF WATERSHED PROTECTION AND MANAGEMENT

The watershed approach to problems of soil and water conservation was utilized almost from the inception of the soil conservation movement. As discussed earlier, the Soil Erosion Service established demonstration projects on a watershed basis, mostly on creek-size watersheds. When emphasis shifted to soil conservation districts, it was often suggested that these districts be formed along watershed or natural land-use boundaries. Watershed programs expanded and flourished when flood prevention and control became major problems of this country.

Benefits from watershed programs can be grouped into two broad classes--upstream and downstream. Upstream benefits are those which accrue to land owners as a result of keeping the soil in place and increasing water infiltration into the soil. Reduced soil erosion and runoff usually lead to higher crop production and, ultimately, to a more stable agriculture.

Downstream benefits from watershed management programs are received primarily by the occupants of the flood plain. These benefits result from keeping upstream soil and water off downstream property. The most obvious type of damage that might result is the direct damage to physical property

by the invading floodwater and the sediment carried by it. Also to be considered are human losses of life, health, and normal activity. Indirect economic losses also occur as a result of the direct physical losses.

The Flood Control Act of 1936 (P. L. 738, 74th Congress) was the first federal legislation to give definite recognition to watershed treatment.[1] Although this act still emphasized works on the main channel, recognition was given to the upstream watershed and its role in flood control. Responsibility for the watershed treatment phase of the flood control program was delegated to the Secretary of Agriculture. An amendment to the 1936 Act was passed the following year which authorized the Department of Agriculture to make preliminary surveys on those watersheds which had been approved by the Corps of Engineers.[2]

Work on these preliminary examinations and surveys continued until 1942, when terminated because of the war. So, up until 1944, the watershed management program had not gone beyond the survey stage. Then the Flood Control Act of 1944 (P. L. 534, 78th Congress) was passed. This Act authorized watershed improvement programs for eleven watersheds comprising about 30,000,000 acres.[3] These watersheds had been

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[1]Carl B. Brown, "Developments in the Small Watershed Approach to Flood Prevention and Conservation," Journal of Soil and Water Conservation, Vol. X, No. 1 (January, 1955), p. 13.

[2]Luna B. Leopold and Thomas Maddock, Jr., The Flood Control Controversy (New York: The Ronald Press Company, 1954), p. 158.

[3]Brown, op. cit., p. 13

examined and surveyed under the authority of the 1936 Act.

Conservation farm plans were prepared for more than 50,000 farms covering 39% of the area of the eleven watersheds.[4] Practices applied included more than 1½ million acres of contouring, more than a million acres of pasture and range reseeded, and the construction of 58,000 miles of terraces.[5] Other structural practices and downstream channel improvements were also established under the provisions of the 1944 Act.

A number of major floods occurred throughout the country during the period of 1948-1952. In the spring of 1948, the Columbia River basin had its most damaging flood in history, based on monetary loss. Property damage was estimated at $100,000,000.[6] The Missouri River flooded two million acres of agricultural land in 1952, giving the highest water levels ever known to white man. This flood caused farm losses estimated at $70,000,000 and total damages estimated at $179,000,000.[7]

The Kansas River flood of 1951 was "... the major Midwest catastrophe of all time."[8] This most disastrous

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[4]M. L. Weinberger and Erwin C. Ford, "Protecting Watersheds--Ways and Whys," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), p. 356.

[5]Ibid.

[6]William G. Hoyt and Walter B. Langbein, Floods (Princeton, N.J.: Princeton University Press, 1955), p. 401.

[7]Ibid., p. 410.

[8]Ibid., p. 407.

flood drove some 250,000 persons from their homes. Estimates as to the damage caused by this flood range from $800,000,000 to a billion dollars.[9] This catastrophic flood was caused by a unique series of events that would seldom be planned for or expected.

Some Kansas streams reached flood stage in late May, 1951. The wettest month in the history of Kansas followed. By the beginning of July, the Kansas River basin was virtually saturated, with little or no capacity to absorb additional moisture. Then came the deluge. Three storm centers received more than sixteen inches of rain from July 9 through July 13.[10] Because of the condition of the soil, nearly all this precipitation ran off the surface almost immediately. The billion dollar flood resulted.

The Kansas River flood illustrates an important point concerning the value of land management as a flood control measure. Proper land management can facilitate infiltration into the soil and, hence, delay the runoff and distribute it over a longer period of time. However, if the soil is already saturated or if the soil surface is frozen, then the benefit of flood control no longer exists. It should be recognized that land management has the most value as a flood control measure in the smaller and more frequent floods that

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[9]Erwin C. Ford, Woody L. Cowan, and H. N. Holtan, "Floods--and a Program to Alleviate Them," Water the 1955 Yearbook of Agriculture (Washington: Government Printing Office, 1955), p. 172.

[10]Hoyt and Langbein, op. cit., p. 408.

occur in upstream tributaries.

So, after experiencing three disastrous floods within five years, the nation was ready to act. Previous flood control programs apparently had not succeeded. A new approach was needed. The first session of the 83rd Congress (1953) appropriated and allocated $5,000,000 to the Department of Agriculture to develop a new program of watershed protection and management. The Pilot Watershed Program was designated "... to find out the best ways of planning and developing upstream watershed protection and flood prevention through cooperation of local, State, and Federal governments and to demonstrate the benefits to be derived from such improvements."[11] This program was carried out by the Soil Conservation Service and the Forest Service.

As stated above, the Pilot Watershed Program was to serve as a testing ground for anticipated future watershed programs. It was a practical lesson in how to develop a successful watershed project. The fifty-eight watersheds contained about 3,000,000 acres and were scattered over thirty-four states. Watersheds were selected in which the local people were informed and ready to move on such a project.

The recommended measures were expected to cost about $69,000,000, half of which was to be borne by the Federal government.[12] Most of the pilot watersheds have proven to be successful demonstration areas. The lessons of failure

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[11] Weinberger and Ford, op. cit.

[12] Ibid.

provided by some of the watersheds have also been valuable in outlining techniques to be used by future programs.

The Pilot Watershed Program was a prelude to the Watershed Protection and Flood Prevention Act (P. L. 566, 83rd Congress). Public Law 566 is unique in that it was designed to encourage local action. It is a local program with federal assistance rather than a federal program with local assistance. Local organizations are responsible for initiating, carrying out, operating, and maintaining watershed projects.

Soil conservation districts in most states have only the authority to initiate watershed projects under P. L. 566. Most districts do not have the legal authority or the financial base on which to carry out, operate, and maintain such projects. Watershed projects are usually co-sponsored with units of local government that have the taxing power. Soil conservation districts may unite with the governing body of the county, township, city, drainage district, flood control district, or with districts created by legislation specifically for the purpose of carrying out the watershed program.

Immediate response to the passage of P. L. 566 was little short of phenomenal. Within three months after the passage of the law, 155 applications for assistance on specific watersheds had already been approved by the designated state agencies and sent on to Washington.[13] Apparently the Pilot Watershed Program had generated considerable public

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[13]Brown, op. cit., p. 17.

concern and interest. However, this was one case in which the interest of the public and the politicians ran ahead of the ability of the administrative agencies.

By December, 1955, Washington had received 402 applications for assistance on P. L. 566 projects. However, only 110 of these plans had been approved and not one work plan had been issued. A desirable program was being obstructed by bureaucratic procedures and red tape. Before actual physical work could start on a watershed project, the local sponsoring organization had to submit an application to the responsible state agency. Unless rejected, the application was then sent to the Secretary of Agriculture.

The Secretary of Agriculture could then, through the Department's field agencies, conduct preliminary investigations and surveys as well as economic studies to determine the feasibility of the project. The Soil Conservation Service was responsible for most of the field work involved in this program. After the Department and the sponsoring local organization agreed upon a plan for works of improvement, specifications were developed and contracts prepared.

Obtaining approval of the work plan is where the red tape began to mount. The Secretary of Agriculture was required to submit a copy of the plan to Congress through the President at least forty-five days before the installation of works. However, any plan that included irrigation or reclamation works or that affected any lands under the jurisdiction of the Secretary of the Interior had to be

submitted to the Secretary of the Interior for his views and recommendations at least sixty days before transmission to Congress through the President. Any plan including Federal assistance for floodwater detention structures was to be submitted to the Secretary of the Army for views and recommendations sixty days before transmission to Congress.

Herein existed a powerful pocket veto for the Army Corps of Engineers. The Corps often acted to delay the progress of P. L. 566 work by pigeonholing project work plans. Often the Corps held plans past the sixty day limit. The first plan took five months for the Corps to review.[14] The Corps of Engineers was protecting its own interests by actively opposing the upstream reservoir program of the Soil Conservation Service. Additional damage was done by the Corps via the views and recommendations it attached to the work plan before it was presented to Congress. Recommendations from the politically-powerful Corps carried considerable weight in Congress.

To be approved, the watershed plan had to get by the state agency, the Department of Agriculture, the Secretary of the Army, the Secretary of the Interior, the President, and Congress. The bureaucracy was certainly at work. This was a long and arduous process, considering the time needed to study the plan, make recommendations, transmit the plan, plus the intentional delays caused by one agency.

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[14]Nolan Fuqua, Tuesday Letter of May 15, 1956. National Association of Soil Conservation Districts.

The watershed program was disentangled somewhat and broadened by an amendment to P. L. 566 passed in 1956 (P. L. 1018, 84th Congress). The program was broadened in that it became more of a multiple-purpose program rather than strictly an agricultural program. Financing was made easier through long-term loans made available to the local sponsoring organization. The Federal government was to bear all flood prevention costs on subsequent watershed developments.

The amendatory act of 1956 also facilitated watershed developments by setting a minimum size limit on structures below which Congressional approval was not required. This act also reduced from sixty to thirty days the maximum time that the Secretary of the Army and the Secretary of the Interior could retain the plans before transmission to the Congress through the President. The effect of the 1956 amendment was to make procedures less cumbersome and less time-consuming.

A running feud between the Army Corps of Engineers and the Soil Conservation Service has retarded the watershed program to such an extent that it deserves additional investigation at this point. The controversy began shortly after World War II when changes in personnel, policy, and methods of economic justification put the Soil Conservation Service in the dam-construction business.[15] When the Service began to build larger detention structures, the Corps criticized

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[15]Leopold and Maddock, op. cit., p. 88.

these structures, primarily on the basis of hydrologic and economic procedures.

It should be pointed out that the controversy revolved around the upstream detention structure program of the Service. The Corps recognized the effectiveness and desirability of the upstream land management program of the Service. The Service recognized the value of the Corps' program of construction of large downstream dams to prevent major floods. Conflict existed as to which program should have priority and as to the jurisdictional limits between the two programs.[16]

The Corps of Engineers, a much older agency than the Soil Conservation Service, was early designated as the agency to work with problems of navigation. Navigation problems led the Corps into the field of flood control. The Corps quite logically attacked the problem of flood control by first acting to protect against large downstream floods. While concentrating on the downstream program, the Corps allowed a void to develop in the upstream areas.

This void was recognized and taken advantage of by the Soil Conservation Service. The Service developed its program of upstream detention structures to complement land management practices in the plan for upstream flood control. The Corps resented this competition in dam construction and openly criticized the Service. Another fact to be recognized is that construction of upstream reservoirs affected methods

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[16] Ibid., p. 84, 246.

of economic justification for downstream structures. Discord resulted from the two agencies working in the same general area and having no established boundaries in jurisdiction.

To summarize this disagreement in programs, the Corps of Engineers utilizes large dams and reservoirs plus levees in the downstream areas to protect against major floods. This program does not give protection against the smaller and more numerous floods that occur in upstream areas. Neither does it give the benefits of land enhancement for upland agricultural lands. The Corps program attempts to prevent disasters associated with large-scale floods.

The Department of Agriculture's upstream flood control program is "... an agricultural program with minor flood control benefits."[17] It is more aptly termed as "flood prevention" than "flood control." This program is aimed at conserving the soil, increasing crop yields, and giving some degree of protection against frequent but minor floods in upstream tributaries. The effect of this program on large floods on the major rivers is negligible.

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[17] Ibid., p. 248.

## CHAPTER VIII

## FUTURE TRENDS IN SOIL AND WATER CONSERVATION PROGRAMS

Through its first quarter-century of existence, the soil conservation program has served primarily the interests of agriculture. First through the demonstration projects, then through soil conservation districts, the program has been aimed at the nation's farmers and ranchers.

Now, the program seems to be moving in another direction. Suburbs are taking much of the nation's high-value agricultural land near urban centers. We are becoming an increasingly urbanized society. There are fewer and fewer farms. These facts have resulted in a major trend in the soil and water conservation program: the move into urbanized areas.

Newly urbanized areas have soil and water problems, just as did the farms that previously occupied their sites. The Soil Conservation Service is now recognizing these problems and is giving more attention to their solution. It hardly need be said that the market for SCS services in urban areas has considerable potential.

Recent articles in Mechanix Illustrated[1] and the

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[1]Harry Kursh, "How to Get Free Land Advice from Uncle Sam," Mechanix Illustrated, (Vol. LVII, No. 8, August 1961), p. 61.

Saturday Evening Post[2] have brought this service of the SCS to the attention of the general public. The article in Mechanix Illustrated stressed the fact that SCS assistance is free. It was noted, however, that urban assistance generally has a lower priority than aid to farmers or ranchers. The article also emphasized the potential value of a knowledge of the soils of an area.

Technical assistance from the Service has already been utilized in many urban areas. Planning commissions in Macomb and Washtenaw counties of Michigan, Fairfax county, Virginia and in the northeastern Illinois metropolitan area have already made good use of soil survey information. In Midland, Michigan the Service's Work Unit Conservationist has adjusted his work week to include Saturday work so that he can contact part-time farmers who also work the day shift in local industries.[3]

Urban assistance is being given by the Service in most areas of the nation. A systematic publicity program would almost certainly result in many more requests for assistance. Most urban landowners have probably never heard of the Soil Conservation Service.

Before discussing more specifically the types of urban assistance offered by the Service, two basic questions should

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[2]"Suburbanites Also Need Education on Soil Conservation," Saturday Evening Post, (May 20, 1961), p. 10.

[3]Letter from Warren A. Blight, Area Conservationist with the Soil Conservation Service located at Saginaw, Michigan, May 31, 1961.

be answered. How can the SCS, an agency in the Department of Agriculture, justify its work in urban areas? In many areas, municipalities are not included in soil conservation districts. Is the Service going to abandon the district approach in these areas and go off on their own?

The Service has answered both of these questions in General Memorandum SCS - 2 (Rev.). In regard to the first question it says, "The basic legislation under which the SCS operates does not restrict assistance to farmers and ranchers or to privately-owned agricultural land."[4] So, it seems that the Service is concerned with all problems related to soil and water. Rural soil and water problems have outweighed those of urban areas in the past. Urbanization is shifting this balance.

The second question is answered as follows: "The Service will not take unilateral action on the servicing by staffs assigned to SCD's of requests from non-agricultural land owners inside or adjacent to the district without the knowledge and consideration of the district."[5] Apparently this means that the Service can work in urban areas as long as the district is made aware of this work. No mention is made of a need to obtain district consent. However Engberg says, in regard to urban assistance, "Such technical information and assistance will be supplied only in the amounts and

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[4]Soil Conservation Service General Memorandum SCS-2 (Rev.), July 7, 1961, p. 1.

[5]Ibid., p. 2.

according to the priorities established by governing bodies of soil conservation districts.[6]

The Service provides three types of assistance in rurban areas: soil survey interpretation, assistance on problems of water management, and general advice on land management, treatment, and conservation.[7] In regard to the soil survey information, small scale generalized maps may be provided for the planner or rural zoner. Large scale detailed maps may be supplied for on-site assistance to solve specific problems.

Bartelli discusses the specific uses of soil survey information in suburban areas. Soils information can be used for:

1. Selection of a satisfactory sewage disposal system
2. Location of borrow materials
3. Determination of potential frost and corrosion action on underground conduits
4. Prediction of mechanical behavior of soils for highway and building construction
5. Development of tree and shrub planting guides
6. Delineation of areas subject to flood damage
7. Selection of sites for recreation areas

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[6]C. A. Engberg, "Responsibility of the Soil Conservation Service and the Soil Conservation Districts in the Provision of Assistance to Nonfarm Groups," (Paper read before Resource Development 815 class at Michigan State University, February 23, 1961), p. 5.

[7]Ibid.

8. Suitability of an area for specialized agricultural crops.[8]

The value of this service can readily be seen. Soil survey interpretation can help local units of government, suburban developers, and others to determine the capabilities of a particular area of land and can help them select its optimum use.

The second type of urban assistance given is in the area of water management. Cities are causing these problems themselves by paving areas for parking lots, streets, buildings, etc. The resulting increase in runoff causes greater flood problems. It should also be remembered that paving prevents rainfall infiltration into the soil, and, hence, reduces ground-water recharge. The Service can assist many cities with watershed management programs to help increase their water supply and to make better use of their present supply.

The third type of assistance available from the Service is general advice on land management, treatment, and conservation. This service is a general consultive type of assistance in which the available information is supplied to the advice seeker. On-site inspection may not be necessary in many cases. This type of assistance could cover almost any type of land problem, including such areas as soils, hydrology,

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[8]Lindo J. Bartelli, "Soil Survey Information for Suburban Development," (Paper presented at the 1960 Annual Meeting of the AAAS in New York, December 1960).

plant technology, taxation, etc.

Now that the present soil conservation program in urban areas has been discussed, a look into the future is in order. One of the most basic factors that must be considered is the role that the federal government will play in the conservation field. As Parks says, "The withering away of the federal government in the conservation field cannot be anticipated."[9] Political pressures would prevent the withdrawal of this program. Conservation of our natural resources has been accepted as one of the goals of our society.

Estimates of future land use should next be attempted. Such estimates have been made in Land for the Future by Clawson, Held and Stoddard.[10] Part of Table 3 was taken from that book.

According to Table 3, a slight decline in agricultural acreage will be accompanied by a great increase in the acreage of urban areas. It should be noted that the urban area is still less than 2% of the total acreage. However, thirty million acres of urban land will certainly provide a multitude of soil and water problems.

In another article Clawson makes a prediction as to future farm numbers. It is doubtful if the United States will

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[9]W. Robert Parks, Soil Conservation Districts in Action (Ames, Iowa: The Iowa State College Press, 1952), p. 181.

[10]Marion Clawson, R. Burnell Held, and Charles H. Stoddard, Land for the Future (Baltimore: The Johns Hopkins Press, 1960).

Table 3.--Some significant expected changes in land use (based on the 48 original states)[a]

| | Million Acres | | | |
|---|---|---|---|---|
| | 1950 | 1980 | % change | % of total land-1980 |
| Cities of 2500 or more | 17 | 30 | +76.5 | 1.6 |
| Public recreation areas | 46 | 72 | +56.5 | 3.8 |
| Agricultural cropland | 409 | 388 | - 5.1 | 20.4 |
| Commercial forestry | 484 | 475 | - 1.9 | 24.9 |
| Transportation | 25 | 28 | + 1.2 | 1.5 |
| Reservoirs and water management | 10 | 15 | +50.0 | 0.8 |
| Primarily for wildlife | 14 | 18 | +28.6 | 0.9 |

[a]Marion Clawson, R. Burnell Held, and Charles H. Stoddard, Land for the Future (Baltimore: The Johns Hopkins Press, 1960), p. 442.

have as many as one million farms by the year 2000.[11] There were about 4½ million farms in 1960. By interpolation, this would mean about 2 3/4 million farms in 1980, almost a 40% decrease in twenty years. However, a significant part of this 40% decrease in numbers will be absorbed by increases in farm size.

As farm numbers decrease and as the area in agricultural cropland diminishes, it will become increasingly difficult to establish conservation practices on agricultural land. There will be a smaller base on which to operate and

[11]Marion Clawson, "Soil Conservation in a Dynamic Society," Journal of Soil and Water Conservation, (Vol. XVI, No. 1, January-February 1961), p. 8.

much of the remaining base will have already been treated with conservation practices.

The greatest potential for expanding the soil conservation program on agricultural land lies in a dual approach. Intensification of conservation work on those farms that have already accepted the desirability of conservation but have not completed a conservation program is one possibility for expansion. This approach would attempt to accomplish higher levels of conservation farming than exist at present.

Another possibility for expanding the conservation program on agricultural land is carrying the program to those farmers who have not yet accepted the concept of conservation farming. This approach would require an extensive educational campaign in an attempt to change the standards and way of thinking of these individuals. By combining these two approaches, there can be found an abundance of conservation work to be done on agricultural land. However, future conservation work probably will not come as easily as it has in the past.

An estimate of the future water situation would next seem in order if a look at future soil and water conservation programs is to be attempted. An estimate of water demand has been made by the Senate Select Committee on National Water Resources (report number three). In 1955 the daily water use in the United States was slightly less than 250 billion gallons (piped water). The Committee estimates that by 1980

we will be using about 600 billion gallons per day.[12] The Committee predicted that water demand would increase faster in the industrial East than in the irrigational West.

Increasing population will cause increases in the demand for water for industry, irrigation, domestic use, waste disposal, and recreation. It should be expected that the greatest increases in water demand would occur in the urban areas. Since many cities are already experiencing water shortages, it seems quite likely that many cities in the future will adopt water development programs.

Development of ground water resources is one possible means of increasing water supplies. This can be done by inducing recharge of ground water aquifers. This method has already been used successfully in Kalamazoo, Michigan and Peoria, Illinois. However, artificial ground water recharge may often be limited by subsurface geological conditions.

Water supply may also be increased by the development of surface water resources. This would aprobably lead to a comprehensive management plan for all the watershed above the city. Future watershed management programs may place more emphasis on controlling water yield for downstream cities than on flood control. If there is a 50% increase in the area of reservoirs by 1980, as predicted by Clawson, Held and

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[12]U.S. Congress, Senate, Select Committee on National Water Resources, National Water Resources and Problems, 86th Congress, 2nd Session, 1960, Committee Print No. 3, p. 1.

Stoddard,[13] then it will probably be much easier to control both water yield and floods. Private water resource developments will also help to control water yield and floods. The trend toward more artificial lake construction and flooding is expected to continue. This will be to serve primarily the uses of recreation, development of areas for home sites, and wildlife.

There are, of course, other means of increasing the net water supplies of an area. It is not suggested that these methods are minor in importance. Industries can often re-use and re-cycle their water. Better sewage treatment methods by municipalities increase the water supply downstream, for polluted water has little use, if any. Another future possibility for increasing water supplies is salt water desalinization. A good method of desalinization would greatly increase water supplies, especially to coastal areas.

The nation's future water supply is adequate to meet its needs if developed and managed intensively. However, adjustments will need to be made in the occurrence of water as to time, location, and quality. Future watershed management programs will be used to bring about these adjustments in the occurrence of water.

To make a prediction of future soil conservation programs, the soil conservation district should be examined. At the end of the 1960 fiscal year, 2,824 districts had covered

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[13]Clawson, Held and Stoddard, op., cit.

87.3% of the nation (forty-eight states).[14] This means that Soil Conservation Service assistance is available in nearly all areas. However, the same data indicate that only 22.7% of the area within districts is covered with basic conservation plans.[15] This means that there is yet a sizeable amount of conservation work to be done in agricultural areas.

Many soil conservation districts in the future will have to adjust to their urban environments. This will lead to urban-oriented clientele, urban-oriented soil conservation practices, and eventually to urban-oriented soil conservation district supervisors. One new function of soil conservation districts will be to develop criteria to determine the conditions under which SCS assistance can be given in the district. Imagination and good judgment will be needed in the conversion to this type of program.

One of the necessities of this new program will be the development of a different type of educational approach to supplement the present program. This new approach will be oriented to the urban group. The Soil Conservation Service will have to describe itself and its functions and become accepted by the urban residents.

Another future change in soil conservation districts may be their boundaries. Because of shifting populations and work loads, consolidation of some districts may be desirable.

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[14] Soil Conservation Service unpublished data.

[15] Ibid.

In other areas additional SCS personnel may be needed. It may be desirable for districts to annex adjoining urban areas, where this is possible under the state laws.

Soil conservation districts have shown considerable potential in the area of public land-use and conservation activity. Success in the future may depend largely upon the amount of state assistance given to supplement the federal help provided through the Soil Conservation Service.[16]

Some projections have been used in an attempt to predict future soil and water conservation programs. For 1980, these changes are predicted:

1. 76% increase in urban areas
2. 140% increase in water demand
3. 50% increase in area of reservoirs
4. 5% decrease in area of agricultural cropland
5. 40% decrease in the number of farms

These predictions point up a need to change emphasis in soil and water conservation programs. Past emphasis has been on agriculture's soil conservation problems. Water resources and urban areas will call for more attention in the future. A complete change of direction is not recommended. There is still much work to be done in agricultural areas. The suggestion is that there be a slight change of direction so as to recognize more fully and emphasize these problems of urban areas and water resources.

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[16]Parks, op. cit., p. 223.

# CHAPTER IX

## SUMMARY

The deteriorating effects of soil erosion have long been recognized in this country. However, there was little concern over this type of soil degradation as long as soil resources were relatively abundant. When increasing population on a stable areal base resulted in a scarcity of good land, soil erosion gained more attention and concern.

A federal appropriation of $160,000 made in 1929 for soil erosion investigations was probably the first significant governmental action aimed at conserving the nation's soil resources. This appropriation was used to set up erosion experiment stations. Research at these stations was designed to determine the basic relationships involved in the process of erosion. Hugh Bennett, later the head of the Soil Erosion Service and the Soil Conservation Service, was selected to direct this research program.

In 1933 President Roosevelt established the Soil Erosion Service in the Department of the Interior. This agency was to provide relief work and to give assistance in soil erosion work. Soon after the establishment of the Soil Erosion Service, it was decided to use watershed demonstration projects as the primary approach to promote soil conservation. At this time the soil conservation program was carried out

almost entirely within the limits of the demonstration projects.

Soil conservation was made a part of the permanent policy of the federal government with the establishment of the Soil Conservation Service in 1935. The Soil Erosion Service was transferred to the Department of Agriculture, renamed the Soil Conservation Service, and given permanent bureau status. At the time of its creation, the Soil Conservation Service was responsible for research on the erosion experiment stations, employment of relief labor, and management of the watershed demonstration projects.

During the period of 1934-1936 a series of great dust storms swept over the United States. These storms deserve consideration in this paper because they drew national attention to problems of resource exploitation by dramatically illustrating the results of improper land use. The dust storms were preceded by an extensive and severe drouth.

The Great Plains area was hit the hardest by the drouth and dust storms. A series of good crop years with adequate rainfall had preceded the drouth. The good crop years encouraged speculation and plowing up the sod cover. When the drouth came, the remaining vegetative cover gave little protection against the incessant winds. Soil blowing then began.

Because of the incomplete coverage given by the watershed demonstrations, it was decided shortly after the creation of the SCS that a new approach was needed to promote soil

conservation work. The new concept devised in answer to this need was the soil conservation district. Districts are local subdivisions of state government and are structurally independent of the federal government. However, the prevalence of soil conservation districts is due primarily to the fact that federal pressure was applied on states and local areas to form these districts.

The Soil Conservation Service and soil conservation districts have developed something of a symbiotic relationship. As one president of the National Association of Soil Conservation Districts said, "The Soil Conservation Service is the very life blood of the districts."[1] The Service provides technical assistance and, more basically, the very reason for existence of districts.

In return the districts give local identification and some local determination to the national soil conservation program. This fact makes it easier for the Service to approach farmers and to persuade them to apply soil conservation practices. Districts also contribute to the relationship by giving political support to the Service. The National Association of Soil Conservation Districts has often supported the SCS before Congress.

During World War II, the goals and objectives of soil conservation were adapted to those of society as a whole.

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[1]U.S., Congress, Senate, Committee on Appropriations, Hearings before the Subcommittee on the Agriculture Department Appropriation Bill for 1948. 80th Congress, 2nd Session, 1948, p. 1117.

The contribution of the soil conservation program was to increase food production. Increased production through conservation was the goal. In some areas demonstration runoff plots were used to visually illustrate the effects of soil erosion. These plots were administered and financed by soil conservation districts.

Another practice used to promote soil conservation work during and after the Second World War was the application of a complete conservation plan on a farm in one day. Great amounts of machinery and personnel were needed to complete this operation. Some of these farm transformations were highly successful, and attracted 50,000 to 60,000 people. The practice of remaking farms was used from about 1941 to 1949.

The watershed approach was used almost from the beginning of the soil conservation movement. The 1936 Flood Control Act was the first federal legislation to recognize the value of watershed treatment. This act resulted in many surveys but no application work. The Flood Control Act of 1944 authorized watershed improvement programs on eleven of the watersheds that had been surveyed under the 1936 Act. A considerable amount of land management practices as well as downstream channel improvements were established under the authority of the 1944 Act.

Three major floods during the period of 1948-1952 caused national attention to focus on problems of flood prevention and watershed protection. Rather than immediately

legislate an action program, Congress instead made an appropriation to the Department of Agriculture to develop a new program of watershed protection and management. The fifty-eight watersheds in the Pilot Watershed Program provided many valuable lessons, both in success and in failure.

The Watershed Protection and Flood Prevention Act (P. L. 566) benefited from the experiences of the Pilot Watershed Program. The P. L. 566 program was designed to encourage local initiative and responsibility. Projects under this program are to be initiated, carried out, operated, and maintained by the local sponsoring organization. However, this program was handcuffed by the many procedures and regulations required. An amendatory act in 1956 disencumbered the P. L. 566 program somewhat. The program was also broadened by a clause that allowed for multiple-purpose developments.

Competition and conflict between the Soil Conservation Service and the Army Corps of Engineers retarded the watershed program. The Corps, by concentrating on downstream problems, attempts to prevent the occurrence of disastrous, large-scale floods. This is accomplished with the use of large dams and reservoirs in addition to levees.

The Soil Conservation Service's upstream flood control program is an agricultural program with minor flood control benefits. The Service's program is primarily one of land management. Conflict between the two programs revolved around which program should have priority and around the location of jurisdictional boundaries between the two programs.

The urbanization of the United States has affected the nation's soil conservation program. This urban phase of the conservation program probably has the greatest potential for future development. Increasing population has caused a greater demand for water and a greater need for a knowledge of soils and how to use them. However, it should be expected that the soil conservation program of the future will continue to be primarily an agricultural program.

# BIBLIOGRAPHY

## Books


Archer, Sellers Gambrell. Soil Conservation. Norman: The University of Oklahoma Press, 1956.

Ayres, Quincy Claude. Soil Erosion and Its Control. New York: McGraw-Hill Book Company, 1936.

Barlowe, Raleigh. Land Resource Economics. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1958.

Bennett, Hugh Hammond. Elements of Soil Conservation. New York: McGraw-Hill Book Company, 1947.

_____. Soil Conservation. New York: McGraw-Hill Book Company, 1939.

_____ and William Clayton Pryor. This Land We Defend. New York: Longmans, Green and Company, 1942.

Brink, Wellington. Big Hugh. New York: The Macmillan Company, 1951.

Bunce, Arthur C. The Economics of Soil Conservation. Ames: The Iowa State College Press, 1942.

Burges, Austin Earle. Soil Erosion Control. Atlanta, Georgia: Turner E. Smith and Company, 1936.

Chase, Stuart. Rich Land, Poor Land. New York: McGraw-Hill Book Company, 1936.

Ciriacy-Wantrup, S. V. Resource Conservation - Economics and Policies. Berkeley: University of California Press, 1952.

Clawson, Marion; Held, R. Burnell; and Stoddard, Charles H. Land for the Future. Baltimore: The Johns Hopkins Press, 1960.

Colman, E. A. Vegetation and Watershed Management. New York: Ronald Press Company, 1953.

Coyle, David Cushman. Conservation. New Brunswick, N. J.: Rutgers University Press, 1957.

Foster, Edgar E. Rainfall and Runoff. New York: The Macmillan Company, 1948.

Hardin, Charles M. The Politics of Agriculture. Glencoe, Illinois: The Free Press, 1952.

Hoyt, William G. and Langbein, Walter B. Floods. Princeton, N. J.: Princeton University Press, 1955.

Johnson, V. Webster and Barlowe, Raleigh. Land Problems and Policies. New York: McGraw-Hill Book Company, 1954.

Kellogg, Charles E. The Soils That Support Us. New York: The Macmillan Company, 1941.

Kohnke, Helmut and Bertrand, Anson R. Soil Conservation. New York: McGraw-Hill Book Company, 1959.

Leopold, Luna and Maddock, Thomas, Jr. The Flood Control Controversy. New York: The Ronald Press Company, 1954.

Lyon, Lyttleton T., Buckman, Harry O., and Brady, Nyle C. The Nature and Properties of Soils. New York: The Macmillan Company, 1952.

Osborn, Fairfield. Our Plundered Planet. Boston: Little and Brown, 1948.

Parks, W. Robert. Soil Conservation Districts in Action. Ames: The Iowa State College Press, 1952.

Renne, Roland R. Land Economics. New York: Harper and Brothers, 1958.

Sears, Paul B. Deserts on the March. New York: Simon and Schuster, 1937.

Smith, Guy-Harold (ed.). Conservation of Natural Resources. New York: John Wiley and Sons, Inc., 1958.

Stallings, J. H. Soil Conservation. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1957.

Timmons, John F., and Murray, William G. (eds.) Land Problems and Policies. Ames: The Iowa State College Press, 1950.

## Articles and Periodicals

Abbott, H. D. "C.C.C. Operations," Soil Conservation, Vol. III, No. 9 (March 1938), pp. 237-238.

Beaumont, Arthur B. "Remade Farm," Soil Conservation, Vol. XIX, No. 2 (September 1953), pp. 40-42.

Beck, Virgil S. "Mizpah Remade in a Day," Soil Conservation, Vol. XIV, No. 1 (August 1948), pp. 12-16.

Bennett, Hugh. "The Complete Watershed Program in Flood Control," Soil Conservation, Vol. XVII, No. 4 (November 1951), pp. 75-82.

Boddy, Herb. "In One Day a New Farm is Born," Soil Conservation, Vol. XVIII, No. 3 (October 1952), pp. 51-54.

Bowman, Isaiah. "Our Expanding and Contracting 'Desert'," Geographical Review, Vol. XXV, (January 1935), pp. 43-61.

Brandt, A. E. "Size and Shape of Control Plots for Runoff Studies," Soil Conservation, Vol. III, No. 8 (February 1938), pp. 209-210.

_____. "The Design of Plot Experiments for Measurement of Runoff and Erosion," Agricultural Engineering, Vol. XXII, No. 12 (December 1941), pp. 429-432.

Brown, Carl B. "Developments in the Small Watershed Approach to Flood Prevention and Conservation," Journal of Soil and Water Conservation, Vol. X, No. 1 (January 1955), pp. 13-18.

Campbell, J. Phil. "Associations Lay Groundwork for Legally-Constituted Districts," Soil Conservation, Vol. III, No. 6 (November 1937), pp. 132-137.

Carnes, Ernest. "Big-Scale Demonstration of Putting Soil Conservation on the Land," Soil Conservation, Vol. VII, No. 11 (May 1942), pp. 279-281.

Carreker, John R. "The Effects of Rainfall, Land Slope, and Cropping Practices on Runoff and Soil Losses," Journal of Soil and Water Conservation, Vol. IX, No. 3 (May 1954), pp. 115-119.

Clawson, Marion. "Soil Conservation in a Dynamic Society," Journal of Soil and Water Conservation, Vol. XVI, No. 1 (January-February 1961), pp. 3-9.

Cohee, Melville H. "Small Watersheds in the Program of the Soil Conservation Service," Journal of Soil and Water Conservation, Vol. XII, No. 5 (September 1957), pp. 215-220.

Duley, F. L. and Ackerman, F. G. "Runoff and Erosion from Plots of Different Length," Journal of Agricultural Research, Vol. XLVIII (Washington: Government Printing Office, 1934), pp. 505-510.

_____ and Hays, O. E. "The Effect of the Degree of Slope on Run-off and Soil Erosion," Journal of Agricultural Research, Vol. XLV (Washington: Government Printing Office, 1932), pp. 349-360.

Ford, Erwin C., Cowan, Woody L. and Holtan, H. N. "Floods -- and a Program to Alleviate Them," Water the 1955 Yearbook of Agriculture (Washington: Government Printing Office, 1955), pp. 171-176.

Fortune magazine. "The Grasslands" (November 1935), p. 59.

Friends of the Land, "The Trials and Tribulations of the Small Watershed Movement," Land and Water, Vol. II, No. 3 (Autumn 1956), pp. 12-13.

Gilbert, Grove Karl. "The Transportation of Debris by Running Water," United States Geological Survey Professional Paper 86, 1914.

Gilman, Virgil D., Hunt, James M., and Simms, D. Harper. "Where Farmers Can Get the Help They Need," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), pp. 321-328.

Hardin, Charles M. "Land or People?," Land Economics, Vol. XXVII (May 1951), pp. 133-142.

_____. "The Politics of Conservation: An Illustration," Journal of Politics, Vol. XIII (August 1951), pp. 461-481.

Heinen, Raymond W. "Technical Assistance for Landsmen," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), pp. 329-332.

Henderson, Caroline A. "Letters from the Dust Bowl," Atlantic Monthly, Vol. CLVII, No. 5 (May 1936), pp. 540-551.

Henderson, H. O. and Hembre, I. O. "The Coon Valley Watershed Project--A Pioneer Venture in Good Land Use," Journal of Soil and Water Conservation, Vo. X, No. 4 (July 1955), pp. 180-184.

Hendrickson, B. H. "A Preliminary Study of Variability of Runoff Plots," Soil Conservation, Vol. V, No. 6 (November 1939), pp. 128-130.

Hope, C. R. "The Progress of the Small Watershed Program," Land and Water, Vol. II, No. 4 (Winter 1956), pp. 15-16.

Horton, Robert E. "The Interpretation and Application of Runoff Plat Experiments with Reference to Soil Erosion Problems," Soil Science Society of America Proceedings, Vol. III (1938), pp. 340-349.

Hoyt, William G. "Droughts," Hydrology, ed. O. E. Meinzer (New York: Dover Publications, Inc., 1942), pp. 579-591.

King, Barrington. "Record Crowd Sees Birth of New Farm," Soil Conservation, Vol. XIV, No. 1 (August 1948), pp. 3-5.

Kursh, Harry. "How to Get Free Land Advice from Uncle Sam," Mechanix Illustrated, Vol. LVII, No. 8 (August 1961), pp. 61-63, 166-169.

Leach, Harry R. "Soil Erosion," Hydrology, ed. O. E. Meinzer (New York: Dover Publications, Inc., 1942), pp. 606-613.

Marsh, C. S. "The Future of the CCC," Conservation, Vol. VI, No. 3 (May-June 1940), pp. 7-9.

Musgrave, G. W. "The Quantitative Evaluation of Factors in Water Erosion - A First Approximation," Journal of Soil and Water Conservation, Vol. II, No. 3 (July 1947), pp. 133-138.

Myer, Dillon S. "The Next Step: Emphasis Shifts to the Districts Plan," Soil Conservation, Vol. III, No. 6 (November 1937), pp. 126-128.

Soil Conservation, "Two Farms Remade Between Dawn and Dusk," Vol. XIII, No. 6 (January 1948), pp. 132-134.

Solberg, Erling D. "Planning for Stability in a Great Area," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), pp. 532-536.

"Suburbanites Also Need Education on Soil Conservation," Saturday Evening Post (May 20, 1961), p. 10.

Van Dersal, William R. "What Do You Mean: 'Soil Conservation'?," Journal of Soil and Water Conservation, Vol. VIII, No. 5 (September 1953), pp. 219-227.

VanDoren, C. A., Stauffer, R. S., and Kidder, E. H. "Effect of Contour Farming on Soil Loss and Runoff," Soil Science Society of America Proceedings, Vol. XV (1950), pp. 413-417.

Walker, Herman, Jr. and Parks, W. Robert. "Soil Conservation Districts: Local Democracy in a National Program," Journal of Politics, Vol. VIII (November 1946), pp. 538-549.

Weinberger, M. L. and Ford, Erwin C. "Protecting Watersheds - Ways and Whys," Land the 1958 Yearbook of Agriculture (Washington: Government Printing Office, 1958), pp. 356-361.

Williams, D. A. "Progress in Soil and Water Conservation," Land and Water, Vol. II, No. 2 (Summer 1956), pp. 23-27.

Wilson, H. A. and Browning, G. M. "Soil Aggregation, Yields, Runoff, and Erosion as Affected by Cropping Systems," Soil Science Society of America Proceedings, Vol. X (1945), pp. 51-57.

## Bulletins, Reports, and Hearings

Bennett, Hugh H. and Chapline, W. R. Soil Erosion a National Menace, United States Department of Agriculture Circular No. 33, 1928.

Browning, G. M., et al. Investigation in Erosion Control and the Reclamation of Eroded Land at the Missouri Valley Loess Conservation Experiment Station, Clarinda, Iowa, 1931-1942," U.S. Department of Agriculture Technical Bulletin 959, October 1948.

Copley, T. L., et al. Investigations in Erosion Control and Reclamation of Eroded Land at the Central Piedmont Conservation Experiment Station, Statesville, N.C., 1930-1940," U. S. Department of Agriculture Technical Bulletin No. 873, August 1944.

Sharpe, C. F. Stewart. What is Soil Erosion?" U. S. Department of Agriculture Miscellaneous Publication No. 286, 1938.

Taft, President William Howard. Conservation of the Soil, U. S. Department of Agriculture, Office of the Secretary Circular No. 38, October 10, 1911.

United States Congress, Senate Committee on Appropriations. Hearings before the Subcommittee on the Agriculture Department Appropriation Bill for 1948. 80th Congress,

United States, Congress, Senate, Select Committee on National Water Resources, National Water Resources and Problems, 86th Congress, 2nd Session, 1960, Committee Print No. 3, p. 1.

United States Department of Agriculture - Soil Conservation Service. Report of the Chief of the Soil Conservation Service, 1935 (Washington: Government Printing Office, 1935).

_____. Report of the Chief of the Soil Conservation Service, 1941 (Washington: Government Printing Office, 1941).

_____. Report of the Chief of the Soil Conservation Service, 1943 (Washington: Government Printing Office, 1943).

_____. A Standard State Soil Conservation Districts Law (Washington: Government Printing Office, 1936).

_____. Soil Conservation Districts for Erosion Control, Miscellaneous Publication No. 293 (Washington: Government Printing Office, 1937).

Whitney, Milton. Soils of the United States, U. S. Department of Agriculture, Bureau of Soils, Bulletin No. 55 (Washington: Government Printing Office, 1909).

## Unpublished Material

Bartelli, Lindo J. "Soil Survey Information for Suburban Development," (Paper presented at the 1960 Annual Meeting of the AAAS in New York, December 1960).

Engberg, C. A. "Responsibility of the Soil Conservation Service and the Soil Conservation Districts in the Provision of Assistance to Nonfarm Groups," (Paper read before Resource Development 815 class at Michigan State University, February 23, 1961).

Fuqua, Nolan. Tuesday Letter, Prepared by the National Association of Soil Conservation Districts, May 15, 1956.

Letter from Warren A. Blight, Area Conservationist with the Soil Conservation Service located at Saginaw, Michigan, May 31, 1961.

Parks, W. Robert. "Effort to Synthesize National Programming with Local Administration in Soil Conservation Districts." Unpublished Ph. D. dissertation, Department of Political Science, University of Wisconsin, 1948.

U.S.D.A., Soil Conservation Service, General Memorandum SCS-2 (Rev.), July 7, 1961.

United States Department of Agriculture - Soil Conservation Service. Statistical Report on Soil Conservation Districts for Fiscal Year ending June 30, 1960, 11 pp. (Mimeographed).