Jane Porter

Droughts Influence Settlement Patterns, Both Yesterday and Today

The United States has a long history of experience with drought. Weather statistics dating back to 1866 tell us the time, location, duration, and severity of past droughts, but little about the next one, except that there will be a next one. The cyclical nature of droughts in the Great Plains has influenced the development of the region. In wet periods, settlers and farmers moved in, only to be driven out, many of them, by the next wave of dry years. That's what happened in the late 19th century, the 1980's, and in between.

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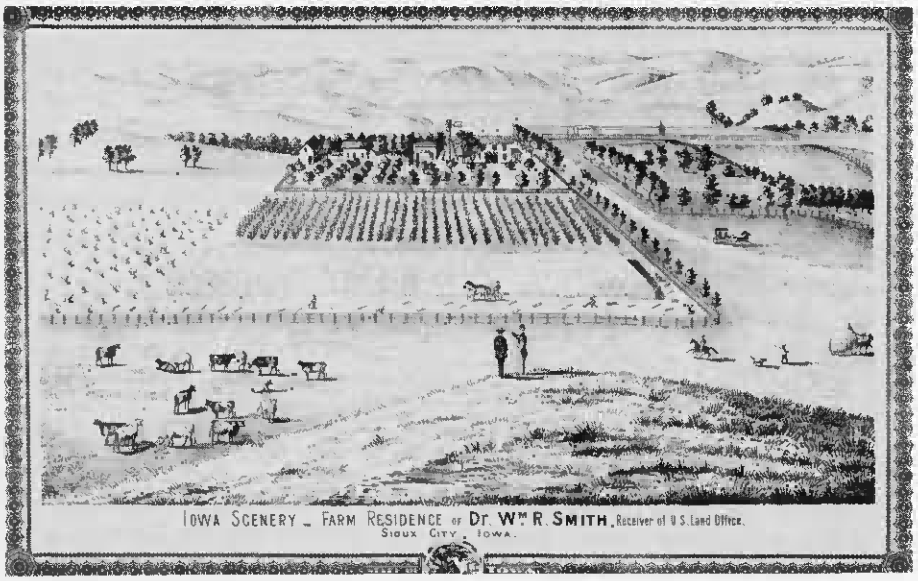
Going west from the Mississippi River, the landscape increasingly illustrates the effects of low rainfall. Treeless areas become larger, and woods are increasingly confined to streambanks. This region has been called the "tall grass prairies" to differentiate it from the "short grass plains" or Great Plains. The two areas merge almost imperceptibly into one another about 100 miles west of Topeka, Kansas. The official line of demarcation is the point where average rainfall drops below 20 inches per year. When the explorer Zebulon Pike first crossed the Great Plains, in 1806-1807, he called it the "the great American desert." The geographer, John Wesley Powell, in 1890, said that the Great Plains should be reserved for cattle raising because the area would never support cultivated crops, but by 1900 the Great Plains had become one of the world's largest grain-producing areas.



Source: Historical Atlas of Iowa, 1875

This lithograph shows state-of-the-art farm practices just east of the Great Plains in the 1870's. Settlers thought they could duplicate such scenes in bringing the Plains under the plow. Note the band of trees sheltering the house and the barbed wire fencing separating the pasture from the planted fields.

After the end of the Civil War, when cheap land in the East was becoming scarce, railroads had spanned the continent, and the Homestead Act had made government lands available free to settlers, settlers headed by the thousands to the Great Plains to stake out claims. The first wave of settlers tried to farm as they had always farmed: general self-sufficient farming with cash crops of wheat and corn, the latter marketed in the form of fattened hogs. During relatively moist years, 1868-78, farmers were able to harvest annual crops of corn. The popular varieties of wheat, however, were ill suited to the cold winters and hot dry summers. They were vulnerable to diseases such as stem rust and chinch bugs, which multiplied in hot dry weather. Droughts from 1879-82 forced most of the first wave of homesteaders to leave the Great Plains, abandoning homes, schools, and churches.

Not all parts of the Great Plains experienced drought in the same year but by 1883 the wet stage of the weather cycle had begun. A series of normal to wet years in the 1880's encouraged farmers to believe that the climate of the Great Plains was changing and that permanent settlement with tree planting and irrigation would accelerate and permanently establish the change. Farmers on the prairies and on the eastern edge of the Great Plains had planted trees around their homes and yards to break the prevailing winds. (Arbor Day, a day to celebrate the planting of trees, was first observed in Nebraska in 1872 and was strongly supported by J. Sterling Morton, a Nebraskan who became Secretary of Agriculture.) The second wave of homesteaders who surged onto the Great Plains in the 1880's planted

trees, first around their homes and later as fences for their fields (see illustration).

This second wave of settlers had windmills and barbed-wire fencing as well, two innovations developed in the 1870's. The windmill was capable of pumping a small but steady flow of water for livestock, a small vegetable garden, and household use. Barbed-wire fencing kept cattle and other animals out of cultivated fields. Farmers fortunate enough to have staked out claims in stream valleys could build ditches and divert water onto some of their cropland, but as settlement pushed westward, settlers found fewer and fewer streams. Irrigation on a larger scale, though still rudimentary, was begun in the valleys of the eastern slope of the Rocky Mountains and in intermountain valleys where the Mormons settled.

A series of dry years began in the southern Great Plains in 1886. By 1887 drought had spread to the central Great Plains and eastward into the prairies. The drought in Texas was so bad in 1886 that farmers could not harvest enough seed to plant their 1887 crops. Farmers were able to harvest a normal crop in only 2 years of the ensuing decade. Speculation during the wet years had inflated land prices. When crops failed during the dry years, many farmers with mortgages lost their land. Others simply abandoned farms that failed to produce enough food and feed for subsistence. Livestock prices fell as farmers and ranchers were forced to liquidate herds. The worst drought years ever recorded in the central Great Plains were in 1893-95.

Searching for Drought-Resistant Wheat

Although President Cleveland had refused to provide seed for drought-stricken farmers in February 1887, his signing of the Hatch Act a month later provided Federal funding in support of a system of State experiment stations. As soon as the State experiment stations in Kansas, Nebraska, and the Dakotas were organized, they set to work to find varieties of wheat that would grow on the Great Plains and be acceptable to millers and bakers.

The German/Russian Mennonite settlers who had come to western Kansas beginning in the 1870's were growing a hard red winter wheat that was drought resistant and winter-hardy and provided food and feed for their families. Millers refused to buy this "turkey wheat," as it was called, because it was so hard that it wore away the grooves in the stone millstones. Farmers needed wheat that was marketable. The USDA and the State experiment stations sent plant explorers to Russia and the Near East to search for additional varieties of wheat. The researchers hoped to breed wheats that would satisfy the requirements of millers while retaining the cold hardiness and drought resistance of "turkey wheat." The stations began planting trials and inbreeding of varieties. They made selections of promising samples from test plots and soon learned to cross-breed seeds from inbred varieties.

Meanwhile, the flour milling industry was being revolutionized by the adoption of a new technology: steel rollers for cracking wheat and grinding flour. When once again a wave of immigrants moved out onto the Great Plains in the late 1890's, they took with them seeds of better adapted and more marketable wheat varieties.

The State experiment stations also tested and popularized dry farming methods that employed "summer fallow" (leaving the wheat stubble on the land through the dry summer months), and cropping in alternate years to conserve moisture. Dry farming required farms with large acreages because only half of the cropland was planted each year and yields were much lower than in other areas with higher rainfall.

The farmers who came to the Great Plains in the late 1890's and later had more sophisticated expectations of local services than the settlers of the 1870's and 1880's. Population density was low, because dry farming required a large acreage per farm. It was difficult to provide and maintain public services such as roads and schools. A one-room school might serve as few as a half-dozen families. Parents were beginning to want public secondary schools that could provide dormitories because distances were too great for commuting. Doctors and hospitals were few and far apart. Churches served large areas but still had congregations too small to maintain resident ministers. When the newly established Cooperative Extension Service was being staffed in the World War I period and the 1920's, the desired staffing pattern was one agricultural agent and one home agent per county. Most counties in the Great Plains States could not alone support an agent, so one agent had to serve two or more counties. State institutions such as colleges, universities, and experiment stations were less well funded than similar institutions in other States.

Panic on the Plains

"When crop failure became evident in the early fall of 1887, the inhabitants became panicky and began dumping their speculative holdings on the market. There was a deluge of mortgage foreclosures, extending on down through the panic year of 1893. Half the population of western Kansas moved out between 1888 and 1892 and large portions of the Plains from Kansas to North Dakota were virtually depopulated. As late as 1891, at least eighteen thousand prairie schooners entered Iowa from Nebraska. Twenty towns in western Kansas were reported as totally depopulated. One of them had a $30,000 opera house and a $20,000 school building. Wichita suffered an almost total real-estate collapse. For years after 1900, houses, finished as well as partly built and never inhabited, were seen rotting away." Fred A. Shannon, *The Farmer's Last Frontier.*

Plowing up the Plains Proved Profitable...

Early in the 20th century, as more settlers were attracted to the Great Plains, urban population growth in the United States and Europe brought increased demand and higher prices for bread grains. Soaring food prices during World War I attracted still more farmers to the Plains. With new technologies such as tractors and combines, one family could handle much larger

acreage, and vast acreages were planted to wheat.

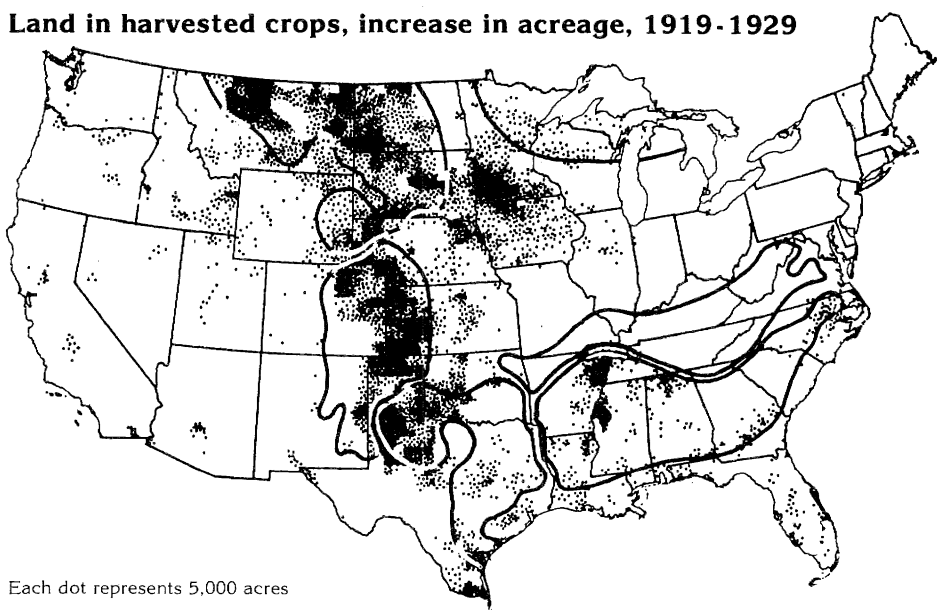
Precipitation on the Great Plains was above normal during the first half of the 1910-20 decade and hovered close to normal during the second half and up until 1924, which was a very dry year. U.S. wheat acreage increased from 50 million acres in 1900 to 73 million acres in 1919, then decreased gradually to 52 million acres in 1925 before starting to rise again to peak at 63 million acres in 1929. Much of the increase and decrease came from land in the Great Plains, which was sometimes left fallow and sometimes planted but not harvested because it did not mature enough wheat to make harvesting worthwhile.

During World War I and the 1920's, much of this wheatland was plowed, planted, and harvested by farmers who worked their holdings during the planting and harvesting seasons but lived elsewhere. Some of these "suitcase farmers" worked in cities. Others owned and operated other farms in more humid areas. Such farmers were not completely dependent on the income from their semi-arid farms and thus had little incentive to make them more drought resistant. As long as there was government land open to homesteading (that is, free land), anyone could stake out a claim, plow the land, and plant a crop. So there was a tendency to extend cultivation onto land even drier than that cultivated by earlier settlers. Most of the remaining grasslands owned by the Government on the Great Plains were withdrawn from homesteading in the 1930's.

...Until the 1930's Dustbowls

A new cycle of dry years on the Great Plains began in 1928. Farmers saw only 3 years of normal precipitation from 1928 to 1937. "The drought of 1934," wrote Secretary of Agriculture Henry A. Wallace in 1935, "was the worst ever recorded in this country." But that was written before the drought of 1936, which hit the Corn Belt States as well as the Great Plains. On the Great Plains the wind blows almost constantly, and the soil is low in organic matter. When these lands were stripped of their natural grass and left bare, millions of tons of dry, powdery soil from the southern Great Plains (western Kansas, eastern Colorado, Oklahoma, and western Texas) were picked up by the winds and blown in huge dust storms clear across the eastern United States and out into the Atlantic Ocean. For people who lived in the "dust bowl," life was almost intolerable. Even inside, there was dust in their food, clothes, eyes, and lungs. People on the Plains had made a practice of sleeping under wet sheets as a form of cooling on hot summer nights, but when the dust storms came, the sheets turned into mud blankets.

Land in harvested crops, increase in acreage, 1919-1929



Each dot represents 5,000 acres

Source: Six Rural Problem Areas, Federal Emergency Relief Administration, 1935.

There are many similarities between the droughts of the 1870's, 1880's, and 1890's and the drought of the late 1920's and 1930's, but there are also important differences. In each case the drought period had been preceded by a period of high demand and good prices, which encouraged farmers to expand production and compete for additional land. The Civil War followed by the Franco-Prussian War of 1870-71 had provided the impetus in the 1870's. The rapid industrialization of the United States and western Europe had fueled demand in the 1880's. U.S. population growth and urbanization increased demand in the early years of the 20th century. And World War I sustained demand in the 1915-1920 period.

In each case, overexpansion in production led to inflation in land prices, commodity surpluses, low prices, and economic distress. The drought of the 1890's coincided with a period of low prices for food grains. Droughts followed periods of rapid increase in production and coincided with periods of low prices. In the early 1930's, the price of corn was so low that farmers burned it for fuel. Wheat, which had sold for $2.16 a bushel in 1919, sold for $0.38 in 1932. Tax support for schools, roads, and other public facilities was uncertain, and many children suffered from a lack of school facilities. More than 30 million acres of Great Plains land moved from private back to public ownership due to tax delinquency during the 1930's. No county-level system for land management existed, and the counties sought to return these lands to private ownership as expeditiously as possible. The turnover catalyzed widespread reorganization of land into larger units that would provide adequate income per farm for remaining farmers but at high cost in human suffering for those who lost their farms.

Aid to Drought-Stricken Farmers

The attitude of the Federal Government toward drought relief changed after the beginning of the 20th century. The first drought relief loans for seed were made in 1918. Feed and seed loans became common during the 1920's, and the Drought Relief Act of 1930 added loans for fuel and fertilizer. The number of loans and the

amount of money involved grew dramatically, but they created additional indebtedness for farmers already overburdened by debt.

The droughts during the Great Depression made the plight of farmers desperate. The Roosevelt administration pledged to help farmers and tried to develop programs to fit the needs of different sections of the country. The severity of the droughts of 1934 and 1936 led President Roosevelt to appoint a Great Plains Committee in September 1936. Its report, *The Future of the Great Plains,* aimed at creating a permanent, drought-immune agriculture on the Great Plains. Many of the recommendations were implemented. Federal financing for reforestation and the planting of shelterbelts of trees and shrubs provided income for drought-stricken farmers and greatly reduced wind erosion. The return of much of the area to grassland under controlled grazing and the establishment of strip-cropping and summer fallow on cropland helped to conserve soil moisture. Construction of farm-to-market roads, schools, post offices, and county courthouses provided off-farm employment, while resettlement programs helped to relocate families displaced from land returned to grazing.

USDA photo

Many shelterbelts, planted by Plains farmers during the Depression, were plowed under in the 1970's in response to good prices for farm commodities.

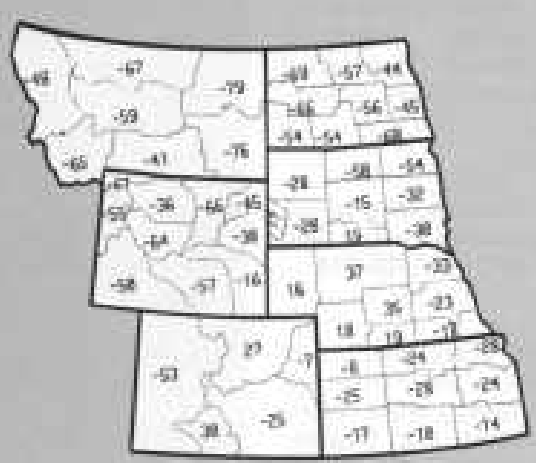
Moisture was adequate for wheat production on the Great Plains during World War II and the immediate postwar period. Due to abundant supplies on hand at the beginning of the war and fears of postwar surpluses, production increases were not urged by the Government until the prospect of postwar shortages and the threat of famine in war-devastated countries was perceived. The incentive of relatively high prices led to some expansion in wheat acreage but this occurred principally through shifts in crops planted on cultivated land.

The drought-control programs of the New Deal demonstrated their effectiveness during the mid-1950's droughts which affected principally the southern Great Plains. The Great Plains conservation program was designed by Congress in 1956 to minimize the hazards of farming and ranching in the Great Plains. Participation was voluntary but the participating farmer or rancher was required to develop, with technical assistance from the Soil Conservation Service, a complete long-range plan for use of the land. The farmer entered an agreement with the Secretary of Agriculture to make all the needed changes within 10 years. The Government would pay from 50-80 percent of the cost in installments as the work progressed. In 1965, 19,600 farmers and ranchers were participating on 39,200,000 acres. The Great Plains Conservation Program was in addition to other USDA programs for farmers. The Soil Bank Program, enacted in 1956, provided for a short-term Acreage Reserve Program and a long-term (10 years) Conservation Reserve Program. The stated objective of both of these programs was soil conservation but there were also other agendas. According to Donald Hadwigger, a political scientist at Iowa State University, the law was used "to channel income subsidies to commercial farmer constituencies," and for drought relief. Framers of the law anticipated that most of the land in the Conservation Reserve Program would never be returned to cultivation.

How we measure drought severity

Drought severity in the United States is measured by the Palmer Index. It combines precipitation, soil moisture, and temperature into a single index in which normal is a range of +/- 2 and extremes are tabulated up to a +/- 8. A figure larger than "-4" is indicative of drought. Historical data reveal long-term weather cycles but the duration of each cycle varies within a range of from 5-20 years.

Great Plains drought readings, Aug. 6, 1988



Index values are in tenths. For example, 37 = 3.7

Source: Weekly Weather and Crop Bulletin, USDA, August 1988.

Droughts Spurred Land Improvements

Over 9 million acres of damaged Great Plains crop and pasture land had been purchased by the Government by

1940 and an additional 4 million plus had been approved for acquisition. These lands were replanted to grass and incorporated into a Government-supervised program of grazing in conjunction with lands owned by neighboring ranchers. Although 13 million acres amounted to only 1 percent of the 541 million acres of U.S. rangeland, this program demonstrated that controlled grazing allowed the natural vegetation to regenerate. It influenced the use of privately owned rangeland and initiated a slow but continuing improvement in rangeland use that is still evident today. A 1980 survey by USDA's Soil Conservation Service showed that range conservation problems ranged from "none to slight" in the Great Plains with the exception of Texas and New Mexico where problems were "moderate." States outside of the Great Plains with significant amounts of rangelands continued to have "severe rangeland problems" caused by overgrazing, according to the Soil Conservation Service survey.

So much land was placed under conservation practices in the late 1930's, 1940's, and 1950's that the landscape of America was changed. There was no significant plow-up of fragile lands on the Great Plains from about 1936 until the 1970's. The programs of the 1930's and the 1950's had encouraged and financially assisted farm families to emigrate. However, land enrolled in conservation programs in the 1950's remained in private ownership, so it could be returned to cropland at any time after the expiration of the conservation contract. Much of this land eventually went to enlarge the farms of those who remained. Elmer A. Starch, an authority on the Great Plains, wrote in 1970, "Out of the wreckage of the depression, the drought, and maladjustment, a fairly strong economy and a reasonably good place to live has been rebuilt."

Conservation Setbacks in the 1960's and 1970's

Farmers have tended to participate in Government farm programs designed to reduce surplus production and conserve the environment when it was to their short-term economic advantage. But when agricultural commodity prices doubled in the 1970's, many farmers nationwide abandoned their conservation programs. A series of abnormally wet years in the 1960's reinforced a revolution in productivity generated by new technologies and the heavy use of purchased inputs. The discovery of large underground water reserves in the southern Great Plains and the development of center-pivot irrigation technology led farmers to destroy hundreds of miles of shelterbelts and land contours in that area to make the land better suited for irrigation. They plowed fragile land that normally should not be cultivated. The dependence on purchased inputs plus frenzied inflation in land values in the 1970's made the economy vulnerable to the shocks of drought which hit in 1976 and again in 1977. Further droughts in 1979, 1981, 1983, 1986, and 1988 established the period as the latest drought cycle. RDP

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History of Federal Drought Relief Programs

Federal drought relief is relatively recent in the United States. Attitudes in the 19th century were summed up by President Grover Cleveland who, in February 1887, delivered a stinging veto of a bill to provide $10,000 in seed grain for drought-stricken farmers in Texas: "Federal aid. . . encourages the expectation of paternal care on the part of the Government and weakens the sturdiness of national character. . . ." Not until 1918, with the Nation deep in war, did Woodrow Wilson authorize $5 million in seed loans to wheat farmers who had lost two successive crops. Similar appropriations followed in 1919, 1921, and 1924.

The administration of Herbert Hoover (1929-33) witnessed considerably enlarged relief programs. During Hoover's first 2 years, USDA made feed and seed loans of $5 million per year, but passage of the Drought Relief Act of 1930 expanded coverage in a fashion that would have been unbelievable earlier. Loans in 1931 amounted to $56 million and rose to $64 million a year later. They required strict and prompt repayment, an impossibility for many farmers, who responded by voting overwhelmingly for Franklin D. Roosevelt in 1932.

New Deal Measures

The first extensive drought relief programs came during the Roosevelt administration. Conditions were the most severe in 1934 and 1936 but were also generally bad through much of the rest of the decade. At the same time, the Nation suffered its worst economic depression, and relief measures for the two disasters were inextricably linked.

Roosevelt put supervision of relief work under an interagency Drought

—by Lowell Dyson, a historian with the Agriculture and Rural History Section, ERS.

Relief Service. The major agencies involved were USDA (especially the new Agricultural Adjustment Administration — AAA), Farm Credit Administration, and the Federal Emergency Relief Administration. Before long, 1,457 counties in 25 States were designated as drought-stricken and became eligible for such things as work relief, livestock purchases programs, seed and feed loans or grants, conservation programs, modified AAA contracts, and reduced railroad rates. Some of these provided cash payments, others brought cheap forage for cattle and cheaper transportation rates. Conservation measures fought erosion on millions of acres. One observer estimated that drought relief expenditures through loans, purchases, and subsidies amounted to around $1 billion between 1933 and 1937.

The 1950's

Farmers had generally favorable weather from the late 1930's to the early 1950's, but between 1953 and 1958, large areas faced drought conditions. The Federal Government relied largely on loan programs, emergency feed provisions, and soil erosion measures.

The Secretary of Agriculture used the authority of a 1949 law to make production loans in regions where drought or other weather problems had caused natural disruptions. Economic disaster loans were available whenever the President declared a State to be a disaster area. Livestock producers also could get special short-term loans after 1953. Money for loans came from a fund established by the Farm Credit Act of 1933.

The Secretary also had the authority to furnish feed from Commodity Credit Corporation (CCC) stocks to livestock in disaster areas. He also shared with States the cost of shipping hay in. Both the Agricultural Conservation Program and the Soil Conservation Service stepped up their efforts against wind erosion.

At one time or another, 33 States were included in disaster areas. The estimated cost of relief programs was $550 million.

Recent Years

The United States has suffered several drought years in the 1970's and 1980's. The most severe were in 1983 and 1988, the latter probably one of the Nation's worst.

The most conventional answer to the problems of natural disaster has been that panoply of loans, grants, and conservation measures used since the 1930's. When the President or the Secretary declares a disaster area, emergency loans have been made available by Farmers Home Administration (FmHA) for up to 80 percent of production losses. Similarly, CCC can reimburse livestock and poultry growers up to half the cost of commercially purchased feed, under the emergency feed program, or they can buy from CCC directly under the emergency feed assistance program. (Under Title I of the Disaster Assistance Act of 1988, feed assistance programs were made part of permanent legislation.) In addition, the Secretary could allow grazing and haying on land reserved for conservation purposes. Finally, in late June 1988, Secretary Lyng authorized the Government to purchase meat directly from producers, a measure rarely used since 1934.

A newer approach to Federal drought relief has been direct payments to producers of wheat, sorghum, corn, barley, upland cotton, and rice. The original program was authorized in 1973 and lasted until 1981, during which time it cost $3.8 billion. Growers were eligible if natural conditions prevented planting or reduced crop production below a certain level. The mounting cost brought the program to a presumed end in 1981, but a regional drought in 1986 revived disaster payments for that year's crops. Title II of the Disaster Assistance Act of 1988 brought it to life once more and extended it to producers of almost all crops grown in the Nation that year.

One feature of the 1988 legislation required most recipients of Title II assistance to buy Federal crop insurance in the following year. Crop insurance, the third alternative form of drought relief, has been around since 1938. Early in the season, farmers buy policies to protect specified crops such as wheat or cotton. Crop insurance has not played a very important role up until this time. During the first 10 years of operation, the statistical calculations were so far off that the government lost vast sums of money and then cut it back drastically. After 1948, it began to expand gradually, but many farmers with better land considered the premiums too high during the 1950's and 1960's and chanced that the Government would provide alternative relief in case of drought. The direct payment programs of the 1970's gave them little incentive to participate. The Federal Crop Insurance Act of 1980, however, strengthened and subsidized crop insurance while supposedly eliminating disaster payments. Farmer participation climbed to over 20 percent, but most still behaved as if they believed that the Government would bail them out in drought years, as indeed it did in 1986 and 1988.

The debate between proponents of crop insurance and supporters of disaster payments will undoubtedly continue as Congress formulates new agricultural legislation. A major item for discussion will be whether to require the purchase of crop insurance by all who participate in commodity programs.