being diverted from agriculture to other uses. Fewer than one-half as many U.S. farms exist today (2.3 million in 1980) as in 1950 (5.6 million). The USDA estimates that 475,000 acres of cropland per year will be diverted from cropland to other uses over the next 50 years. And thousands of farmers have tried to reduce their dependence on farm income, either by leaving their farms entirely or by farming fewer acres. It is not surprising, then, that many farmers find it unprofitable to make investments in maintaining soil quality. One USDA study found the costs of implementing soil conservation techniques in Iowa to be three times as great as the benefits to farmers. It follows that real progress in maintaining soil productivity will be difficult until such time as the returns to agriculture are at least equal to the returns in nonagricultural industries. Over the long term, agricultural economists forecast that reductions in the number of farms, increases in the average size of these farms, and expansion of the agricultural export market should steadily increase the returns to farming. Over the short horizon, however, the picture is much more gloomy. Three successive years of bumper crops and a worldwide recession have steadily driven down farm prices and incomes. Also, this increasingly capital-intensive industry has been hurt by high interest rates. In 1982 the real income of farm operators (measured by average personal disposable income)

per farm, adjusted for inflation) reached its lowest level since 1969.14

A Case of Government Failure?
The analysis presented here supports conclusions from two different kinds. First, with regard to the specifics of the soil conservation problem in the United States, the data make the argument for specific conclusions on soil conservation programs more difficult to establish. If the programs are intended to redress international inequities, the USDA argued that merely maintaining current agricultural capacity is not enough— that future generations are entitled to greater agricultural resources than are currently available. If the programs are aimed at combating pollution, the magnitude of the problem faced by society is much greater than that confronted by the program. Furthermore, the inadequacy of other available alternatives need to be more clearly established. Most importantly, if the programs are to be more than just income transfers to farmers, it must be demonstrated that Congress and the USDA possess (or can find) sufficient knowledge, power, and determination to make the programs work.

Second, with respect to the operation of government programs in general, the case of soil conservation illustrates a recurring theme in the literature of economics and politics that both markets and governments sometimes fail to allocate resources equitably and efficiently. In particular, the analyses presented here implies that these two decision-making mechanisms often fail for much the same reasons. To maintain intergenerational equity, for example, a soil conservation program might be necessary because a system of private markets might not provide sufficiently for the needs of future generations. But the actions of Congress with respect to the ACP bear out the fears of many

natural resource economists that public decision-making mechanisms might not be any more cognizant of the needs and rights of future generations than are private markets. The 1975 decision of which conservation projects to fund, although seemingly based on technical issues in farm management, represents a victory of current farming interests over the interests of farmers and consumers in the future.

Similarly, in dealing with soil-erosion-related water pollution, the same factors that cause private markets to fail also hinder government programs directed at the problem. If the extent of soil pollution of rivers and lakes caused by individual farms could be monitored through a system of taxes, it could be devised to deal with this problem, while leaving soil management policy in private hands. In fact, if the number of affected individuals were small and property rights were clearly established and enforced, the market itself might be able to solve this problem efficiently through a system of payments between farmers and those hurt by soil-erosion-caused pollution. Since it is difficult and expensive to monitor water-pollution rates in this way, however, the government might have to encourage specific farming practices to deal with this situation. The trouble is that government in this instance has no guidelines by which to target its resources on the problem or gauge success in achieving its goals. Under these circumstances, legislators and agencies tend to measure program performance in terms of numbers of participating farms, types of conservation practices performed, and total dollars spent, rather than in terms of soil saved or waterways cleaned of pollution. If public authorities are at all inefficient in executing these programs, this situation tends to exacerbate that inefficiency by frustrated, the government’s evaluation and control. It is not at all surprising, therefore, that analysts have found soil conservation resources poorly focused in terms of soil erosion needs.

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Economic Commentary
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Soil Conservation: Market Failure and Program Performance
by Paul Gay-Wykoff

Since the days of the Dust Bowl, policy analysts and policymakers have worried that uninformulated and/or indifferent farmers might bear out the very recession or simply be involved with the "wrong"—the soil. In the 1970s and 1980s, this concern has intensified as pollution and the restrictions on the use of chemical fertilizers and other agricultural chemicals that can cause soil-erosion-related pollution. Since it is difficult and expensive to monitor water-pollution rates in this way, however, the government might have to encourage specific farming practices to deal with this situation. The trouble is that government in this instance has no guidelines by which to target its resources on the problem or gauge success in achieving its goals. Under these circumstances, legislators and agencies tend to measure program performance in terms of numbers of participating farms, types of conservation practices performed, and total dollars spent, rather than in terms of soil saved or waterways cleaned of pollution. If public authorities are at all inefficient in executing these programs, this situation tends to exacerbate that inefficiency by frustrating, the government’s evaluation and control. It is not at all surprising, therefore, that analysts have found soil conservation resources poorly focused in terms of soil erosion needs.

Second, it has been argued that even if agricultural markets operate efficiently, resources might not be distributed equitably across generations by a system of private markets. Once farmland is badly eroded, it is technically possible to restore it to its productivity through the heavy use of crop residues and fertilizers; yet, the costs are such that it is quite often economically inefficient to do so. Practically speaking, then, land that is destroyed by current generations will be permanently lost to society (or less for the 100 years or 200 years that it takes for land to regenerate naturally). Since succeeding generations are not direct participants in the market for agricultural land and other factors of production, their well-being is not necessarily those of the author's.

2. See Secretary Block's remarks in a hearing before the U.S. Senate Committee on Agriculture, Nutrition, and Forestry, Administration's Recommendations for a Comprehensive Soil and Water Conservation Policy for the United States, GPO, pp. 13-16.


5. See Secretary Block's remarks in a hearing before the U.S. Senate Committee on Agriculture, Nutrition, and Forestry, Administration's Recommendations for a Comprehensive Soil and Water Conservation Policy for the United States, GPO, pp. 13-16.

6. The major criticism of the Agricultural Conservation Program is that its cost-sharing programs for specialized crops have little impact on the rate of soil erosion. The consensus among soil experts is that the resources devoted to soil conservation can make little or no significant difference in soil erosion when the diversion of cropland to other uses is so large. A recent USDA study concluded that "effectively targeting erosion control measures to the proper location" would not achieve enduring conservation results. The Agricultural Conservation Program's effectiveness is further diminished by the low rate of participation in the program. The major criticism of the Agricultural Conservation Program is that its cost-sharing programs for specialized crops have little impact on the rate of soil erosion. A recent USDA study concluded that "effectively targeting erosion control measures to the proper location" would not achieve enduring conservation results. The Agricultural Conservation Program's effectiveness is further diminished by the low rate of participation in the program.


8. To Protect Tomorrow's Food Supply, p. 16.

9. To Protect Tomorrow's Food, p. 16.
vionists argue that a system of unfet-
ted private-resource markets would
not attention would be given to the
needs of future generations, it
might make sense for the government to
reallocate resources from current
farmers to future generations. This
would be similar to the redistribution of
income from rich to poor members of the
current generation. Ideally, a government
responding to this type of information
would try to lower the discount rate (or in-
terest) on all productive resources, man-
aged as natural resources are, to consider
the needs of future generations. This
would be similar to the redistribution of
income from rich to poor members of the
population.

Intergenerational equity is a term that is
frequently used to express the idea of
considering the long-term effects of poli-
cies or actions. For example, the US
Department of Agriculture (USDA)
considers that cropland with a deep
topsoil layer can withstand the loss of
5 tons of topsoil per acre per year without
loss of productivity. Cropland covered
with a thin layer of topsoil can withstand
the loss of 1 ton of topsoil per acre per
year without loss of productivity. These
equations are based on the assumption that
nature rebuilds the soil. Based on these
assumptions, the USDA estimates that
farmland is enormous. When these ero-
dion rates are considered together, the
average national erosion rate for crop-
lands is estimated to be 0.75 tons per
acre per year. By these estimates, soil ero-
dion will continue to be a problem for
many years, and the loss of soil will con-
tribute to a reduction in future productivity.

The Corn Belt states, while encoun-
tering the highest soil erosion rates. In 1977, for
example, the USDA estimates that there were 3.8 million
acres of cropland with a topsoil layer less than 1 foot thick. The
impact of these very slow rates of soil erosion is high. For ex-
ample, Illinois cropland lost an average of 6.7 tons of topsoil per
acre, Iowa cropland lost an average of 3.2 tons of topsoil per
acre, and Missouri cropland lost 10.9 tons of topsoil per
acre. Despite these seemingly alarming sta-
tistics, soil erosion does not present
American agriculture with a crisis situa-
tion. Although the rate of erosion is high
in many areas, implying a decline in
farm productivity, the stock of U.S.
farmland is enormous. When these ero-
dion trends are converted to annual
rates, the approximate loss of soil at which nature rebuilds the soil.) Based
on these standards, the USDA esti-
mates that about one-third of the cropl-
and in the United States is eroding too
fast to rebuild all of its productivity.
If these trends continue, it will not be
possible to meet the demand for farm
products in the future. The USDA has
estimated that farmland typically can
withstand the loss of 650 tons of topsoil
per acre before becoming uneconomic
to farm. By these estimates, soil erosion
doiing the stock of available farmland is
diminishing by only 0.15 percent per
year. Simply put, the soil is not erod-
ing at a rate that is likely to be substi-
tutional. Thus, the USDA estimates that
the current generation is passing on
resources to future generations that
are less productive than it received.

The Agricultural Conservation Program
(ACP), with a fiscal 1982 budget of $190
million, provides cost-sharing funds to
farmers who undertake approved soil
conservation projects. The ACP has been
officially stated to provide technical assist-
ance and advice to farmers who request
help. Also, little effort is devoted to follow-
up visits to farmers who have been given conserva-
tion projects. In 1977, the 1974 GAO
study cited earlier found that there was
no significant difference in soil erosion
rates for farmers assisted by the ACP
and farmers without such assistance—a
negative finding independent of con-
sortiums' efforts against the program.

The major criticism of the Agricultural
Conservation Program is that its cost-
sharing programs have little impact on
the rate of soil erosion. The consensus
among soil experts is that the resources
devoted to soil conserva-
tion are too small to have a significant
impact on the rate of soil erosion. A
USDA study concludes that "effectively targeting erosion con-
servation projects could reduce the
amount of soil eroded by more than
threefold. The current soil conservation
policy has two principal components. The Conser-
vation Operations Program (COP), with
a fiscal 1982 budget of $311 million, pro-
vides technical assistance and advice
to farmers about how to implement soil
conservation projects, mostly in the form of detailed soil
conservation plans for individual farms. The Agricultural Conservation
Program (ACP), with a fiscal 1982 budget of $190
million, provides cost-sharing funds to
farmers who undertake approved soil
conservation projects. This program
was created in 1977 to separate its program completely
from ACP. GAO reported that "state
officials said that this action had been
taken because the ACP authorized too
many production-oriented practices that
would not achieve enduring conserva-
tion benefits." Why does the USDA continue to
fund projects that save negligible amounts
of soil while diverting more than half of its
funds to other programs? Said GAO."
To protect Tomorrow's Food, p. 16.
To Protect Tomorrow's Food, p. 16.

9. To Protect Tomorrow's Food, p. 16.

5 tons of topsoil per acre per year without loss of productivity. Cropland covered with a thin layer of topsoil can withstand the loss of 1 ton of topsoil per acre per year without loss of productivity. This soil erosion problem is distributed quite unevenly across the United States, although it is most evident in the Great Plains, and the Pacific Northwest—are particularly hard hit by soil erosion. The General Accounting Office (GAO) studied a random sample of 283 farms in these regions in 1977 and found that 80 percent of the farms had erosion rates of over 5 tons per acre per year. 2

1. See USDA, Soil and Water Resources Conservation Act Approval, Part I: Soil, Water, and Conservation Operations Program (COP), with a fiscal 1982 budget of $311 million, provides technical assistance and advice to farmers about how to reduce soil erosion. Any effort is devoted to follow-up visits to farmers assisted by COP and


2. Most observers agree that the current soil conservation programs are not working; indeed, there is little evidence to indicate that they have had any impact on the rate of soil erosion. The consensus among soil experts is that the resources devoted to soil conservation do not seem to have been increased an average of 1.82 percent per year from 1970 to 1978 and 1.73 percent over the 48 year period from 1930 to 1978. 3 Since additional fertilizer use has caused much of the yield increase, any productivity increase will probably be lower than 1.82 percent because of higher energy costs and higher environmental restrictions. Even at its lowest post-Depression point in the 1940s, however, output per acre grew at an annual rate of 0.3 percent. Sampson estimates that the soil of available farmland is declining by only 1.5 percent per year. 4

5. GAO 1.13: Agricultural Conservation Operations Program (COP), with a fiscal 1982 budget of $311 million, provides technical assistance and advice to farmers about how to reduce soil erosion. Any effort is devoted to follow-up visits to farmers assisted by COP and


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being diverted from agriculture to other uses. Fewer than one-half as many U.S. farms exist today (2.3 million) as in 1950 (5.6 million).11 The USDA estimates that 475,000 acres of cropland per year will be diverted from cropland to other uses over the next 50 years.12 And thousands of farmers have tried to reduce their dependence on farm income, either by leaving their farms entirely or by farming part-time. It is not surprising, then, that many farmers find it unprofitable to make investments in maintaining soil quality. One USDA study found the costs of implementing soil conservation techniques in Iowa to be three times as great as the benefits to farmers.13

It follows that real progress in maintaining soil productivity will be difficult until such time as the returns to agriculture are at least equal to the returns to nonagricultural industries. Over the long term, agricultural economists forecast that reduction in the number of farms, increases in the average size of these farms, and expansion of the agricultural export market will steadily increase the returns to farming. Over the short horizon, however, the markets are much more glibly. Three successive years of bumper crops and a worldwide recession have steadily driven down farm prices and incomes. Also, this increasingly capital-intensive industry has been hurt by high interest rates. In 1982 the real income of farmers (measured here in terms of per farm, adjusted for inflation) reached its lowest level since 1965.14

A Case of Government Failure?

The analysis presented here supports conclusions reached in other studies. First, with regard to the specifics of the soil conservation problem in the United States, the data make the argument for specifying economic incentives on soil conservation programs more difficult to establish. If the programs are intended to redress international inequities, it can be argued that merely maintaining current agricultural capacity is not enough—future generations are entitled to greater environmental benefits as a resource is currently used. If the programs are aimed at combating pollution, the magnitude of the problem caused by these resources and the inadequacy of other available alternatives need to be more clearly established. Most importantly, if the programs are to be more than just income transfers to farmers, it must be demonstrated that Congress and the USDA possess (or can find) sufficient knowledge, power, and determination to make the programs work.15

Second, with respect to the operation of government programs in general, the case of soil conservation illustrates a recurring theme in the literature of economics and politics that both markets and governments sometimes fail to allocate resources equitably and efficiently. In particular, the analyses presented here implies that these two decision-making mechanisms often fail for much the same reasons. To maintain intergenerational equity, for example, a soil conservation program might be necessary because a system of private markets might not provide sufficiently for the needs of future generations. But the actions of Congress with respect to the ACP bear the fears of many resource economists that public decision making mechanisms might not be any more cognizant of the needs and rights of future generations than are private markets. The 1975 decision of which conservation projects to fund, although seemingly based on technical issues in farm management, represents a victory of current farming interests over the interests of farmers and consumers in the future.

Similarly, in dealing with soil-erosion related water pollution, the same factors that cause private markets to fail also render government programs directed at the problem. If the extent of soil pollution of rivers and lakes caused by individual farms could be monitored and measured in a system of taxes could be devised to deal with this problem, while leaving soil management policy in private hands. In fact, if the number of affected individuals were small and property rights were clearly established and enforced, the market itself might be able to solve this problem efficiently through a system of payments between farmers and those hurt by soil-erosion caused pollution. Since it is difficult and expensive to monitor water-pollution rates in this way, however, the government might have to encourage specific farming practices to deal with this situation. The trouble is that government in this instance has no guidelines by which to target its resources on the problem or gauge success in achieving its goals. Under these circumstances, legislators and government agencies tend to measure program performance in terms of numbers of participants, types of conservation practices performed, and total dollars spent, rather than in terms of soil saved or waterways cleaned of pollution. If public authorities are at all inefficient in executing these programs, this situation tends to exacerbate that inefficiency by frustrating program evaluation and control. It is not at all surprising, therefore, that analysts have found soil conservation resources poorly focused in terms of soil erosion needs.

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Soil Conservation: Market Failure and Program Performance

by Paul Gary Wyckoff

Since the days of the Dust Bowl, policy analysts and policymakers have worried that unformed and/or indifferent farmers might wear out the very resources that made their livelihood—the soil. In the 1970s and 1980s, this concern has intensified as policies to farm the nation's natural resource scarcity and environmental quality issues. This Economic Commentary analyzes the economic rationale behind soil conservation programs, assesses the magnitude of the soil erosion problem, and evaluates the effectiveness of current U.S. soil conservation policies. In addition, this article analyzes the reasons why these programs failed to meet most of their objectives, and it illustrates some common problems in making and carrying out public policy.

Economic Basis for Soil Conservation

Soil conservation programs have two principal economic objectives. First, from the standpoint of efficiency, it can be argued that soil conservation is economically efficient because it prevents some of the erosion-related pollution of rivers and streams. The eroding soil hinders the navigation of these waters, and it also can change their ecological character (e.g., by filling up ponds and changing them to marshes), thus destroying the habitat of the wildlife. In addition, the soil can act as a carrier of pesticides, fertilizers, and other agricultural chemicals that can damage the aquatic environment.

The magnitude of this environmental problem has not been clearly established. However, soil conservation programs can be especially important here because soil-erosion-related pollution is of a "non-point" nature—it cannot be easily traced to particular farms or farmers. As such, the system of environmental regulations or fees cannot be used to combat soil-erosion related water pollution.

Second, it has been argued that even if agricultural markets operate efficiently, resources might not be distributed equitably across generations by a system of private markets. Once farm- land is badly eroded, it is technically possible to restore its productivity through the heavy use of crop residues and fertilizers; yet, the costs are such that it is quite often economically inefficient to do so. Practically speaking, then, land that is destroyed by current generations will be permanently lost to society (or lost for the 100 years to 250 years that it takes for land to rejuvenate naturally). Since succeeding generations are not direct participants in the markets for agricultural land and other factors of production, their well-being depends entirely on the benevolence of the current generation in preserving these resources for future use. Many conser-
being diverted from agriculture to other uses. Fewer than half of many U.S. farms exist today (2.3 million in 1980) as in 1950 (5.6 mil-

The USDA estimates that 475,000 acres of cropland per year will be diverted from cropland to other uses over the next 20 years.17 And thousands of farmers have tried to reduce their dependence on farm income, either by leaving their farms entirely or by farming part-time. It is not surprising, then, that many farmers find it unprofitable to make invest-

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11. USDA, Agricultural Statistics, 1980, p. 417. 12. USDA, Soil and Water Resources Conserva-
tion, Part II, Soil, Water, and Related Resources in the U.S.: A Guide-

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