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Natural Resource Issues and Agricultural Policy: Ideas From a Symposium

NATURAL RESOURCE ISSUES AND AGRICULTURAL POLICY: IDEAS FROM A SYMPOSIUM. Edited by Lee A. Christensen, Natural Resource Economics Division, Economic Research Service, U.S. Department of Agriculture, Washington, D.C. 20250; ERS Staff Report AGES850420. May 1985.

ABSTRACT

This report summarizes ideas from a symposium at the 1984 summer meeting of the American Agricultural Economics Association. The symposium addressed the interaction of natural resources and food policy issues in the formulation of government policy. Attention focused on the role of natural resources in the policy formulation process and on likely impacts of alternative policies. Issues addressed included specific resource topics such as soil conservation and water use and conservation. Also addressed were broader issues such as the appropriate roles of government in influencing resource use. Papers also addressed the interactions and conflicts inherent in the policy formulation process and the implications of alternative approaches.

Key Words: Natural resources, conservation, food policy, agricultural policy

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NATURAL RESOURCE ISSUES AND AGRICULTURAL POLICY--A SUMMARY

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This publication presents ideas from an organized symposium entitled "Natural Resource Issues and the 1985 Farm Bill" held during the 1984 American Agricultural Economics Association annual meeting at Cornell University. The focus of the symposium was to highlight resource use concerns, both for the current round of farm bill debates, and for a look beyond specific provisions of 1985 legislation to opportunities for shaping longrun resource use policies.

Given the dynamic nature of the policy formulation process, it is not surprising that some of the materials presented during the symposium and included in the following set of papers may have been superseded by developments in the farm bill debate in the intervening period. However, many of the ideas discussed transcend specific pieces of legislation and address questions with general applicability to agricultural legislation and natural resource issues.

Early expectations that natural resource issues, particularly soil conservation and soil productivity, would receive major attention in the legislation may have been premature (2). 1/ Commodity program issues and firm survival have dominated the debate. In the draft Agricultural Adjustment Act of 1985, the Resource Conservation title, Title XV, the emphasis is on the establishment of provisions to make ineligible for agricultural program benefits those farmers producing an agricultural commodity on highly erodible lands.

The symposium addressed both the overall context and the specific issues related to natural resource to stimulate thinking about 1985 farm legislation. Papers presented focused on selected aspects of the interactions of natural resource and food issues and government agricultural policy. Topics included the policy formulation process, the potential linkages between natural resource and food policy, soil conservation issues, the possibilities for consistency between conservation and commodity programs, and a financial perspective on soil conservation.

Schaller's paper set the stage by providing an overview of the policy formulation process and how natural resource use questions have been addressed in past debates. He identified the types of information needed for

1/ Underscored numerals in parentheses refer to references at the end of each paper.

policy formulation and provided an assessment of what is available and what is needed for future policy development.

Libby addressed the linkages between natural resources, food systems, and farm policy formulation. He discussed the appropriate role of government in the formulation of natural resource policy and how institutional structures influence the determination and attractiveness of policy options. He also discussed the expanding agenda of resources and the food system, and implications for education and extension needs in natural resources policy.

Clark and Paulsen addressed the issue of consistency in the formulation of natural resources and food policy. They discussed ongoing studies by USDA and Iowa State University which investigate relationships between commodity program participation and soil conservation. They also addressed consistency in a broad context which covers the gamut of alternative natural resource policies and the likely impacts of some of these alternatives. Examples include the need for greater consistency in the rules and regulations for establishment of permanent cover, a need for guidance in the selection of land to be withdrawn using production control policies, and the use of more precise techniques (such as soil mapping units) to set base crop yields for government programs.

Kiker's discussion points out the importance of a long-term perspective for addressing natural resource issues, which contrasts sharply with the short-term focus of agricultural legislation. The shortrun financial pressures on many farmers can prevent the adoption of conservation plans which need a long term for payback. The direction of the farm economy points to an increasing soil erosion problem and focus of policymakers on macroeconomic concerns rather than resource use.

A common theme of the papers is that the process of agricultural policy formulation and implementation needs to consider natural resources issues and their linkages with food policy. Positions taken on the appropriate scope of natural resources policy range from a focus on specific natural resources issues such as soil conservation, long-term soil productivity, or water quantity and quality to a shift away from single issue concerns and a focus on development of integrated and consistent multifaceted policy.

There is evidence of significant changes in the underlying environment for the formulation of agricultural policy. Some have argued that the 1985 farm legislation will set the tone for farm policy through the end of this century. Debate on farm legislation will intensify as interest groups, both agricultural and nonagricultural, seek to add their own special imprint. Determining who controls and influences the agricultural policy agenda is important. Traditional agricultural interests are finding that other interests also want to influence farm policy. Numerous conservation organizations have discovered that farm legislation affects their interests since farmers influence wildlife habitat, water quality, and farmland conversions as well as the quality of future soil resources. Also, increased influence of the nonfarming rural population challenges the idea that to let land erode is an absolute property ownership right. Water quality goals of fishable and swimmable water will not be obtainable without best management practices directed at nonpoint pollution, much of which are byproducts of agricultural production. Thus, many people seeking to influence farm-related legislation are not traditional actors in the farm legislation arena.

Batie has suggested that, generally, resource policies have not been integrated into other agricultural policies (1). For example, the 1981 farm bill had resource policy provisions placed near the end of the bill (separated from other programs and policies). For the most part, the legislation has not been enacted. Another example of the lack of integration of resource policy with other agricultural policies is the experience with the payment-in-kind (PIK) program. The opportunities to link soil conservation with the PIK program were missed, and targeted diversion was not a part of the PIK program. Thus, an opportunity for obtaining soil conservation at little or no additional cost was lost.

Batie argues that there are some fundamental changes occurring which may force more recognition of resource goals in the design of other agricultural policies. She suggests several reasons why resource policy and particularly soil conservation and water quality policies have not been well integrated into other agricultural policies. These include: the lack of importance of resource problems, lack of potential pay-off, conflicts with other program goals, the nature of the USDA mission, and the lack of data.

In a recent policy conference held in California, Benbrook and others addressed resource dimensions of agricultural policy (2). They expressed confidence that the new farm bill will include some substantive resource management initiatives. They expected some special provisions addressing ground-water contamination and perhaps some innovative policies encouraging more cost effective and safer pesticide use patterns. The main policy issue they thought would arise is soil erosion, with its consequences of lost productivity and damages to water quality. They asserted that linkages of erosion control with commodity policies will get much more attention than in previous farm bills.

Benbrook and others suggest that the budgetary constraints and the high demands placed upon supply management by the commodity programs may lead to annual caps on the spending of the commodity programs. With Congress facing severe constraints and public outcries over traditional supply control programs, there may well be enthusiasm and growth in the demand for a conservation reserve program. Consequently, they predicted that some sort of a multi-year, contractual land reserve program, targeted to erosive soils, will be established in 1985 with implications in the 1986 crop year.

Many forces will influence the final form of the 1985 agricultural legislation. The relative emphasis natural resource issues will receive is unclear. Regardless of the outcome, all the issues raised in this symposium will not be resolved, thus insuring continued debate on natural resource questions and their place in agricultural legislation.

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NATURAL RESOURCE ISSUES AND FARM LEGISLATION--AN OVERVIEW

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Few policy events have received more advance billing than the discussions preliminary to 1985 farm legislation. The debate is fueled by crop surplus conditions, disappointment with past farm policies, and a plethora of conferences, hearings, and reports.

How will 1985 farm legislation be shaped, and by whom? Don Paarlberg tells us that "policy agenda committees" decide what issues will be addressed in legislation (8). Senior members of the farm bill agenda "committee" include the Agriculture Committees of Congress, the USDA, farm organizations, and land grant colleges. Other groups vie for membership on the so-called committee, or otherwise seek to influence the agenda. Concerned with issues such as health and safety, poverty, civil rights, and environmental quality, they have been quite successful in the last two decades.

Nevertheless, natural resource issues addressed in farm bills are, first and foremost, agricultural issues. Policy agenda committees prefer to concentrate on those issues for which they have major, if not sole, jurisdiction. Nonagricultural resource concerns--endangered species and surface mining, for example--are shared with or fall within the domain of other agenda committees. Their members represent agencies and organizations such as the Interior and Insular Affairs Committees of Congress, the Department of Interior, Corps of Engineers, and the Environmental Protection Agency.

The farm bill agenda committee, like other committees, also tries to limit itself to issues on which it feels it can reach internal compromise without serious conflict or delays. Doing so is now more difficult for two reasons: The diversity of public in food and agricultural legislation and the openness of the Federal policy process, the latter due to legislative reforms in the wake of Nixon's presidency (3).

Farm bills usually address two kinds of natural resource issues:

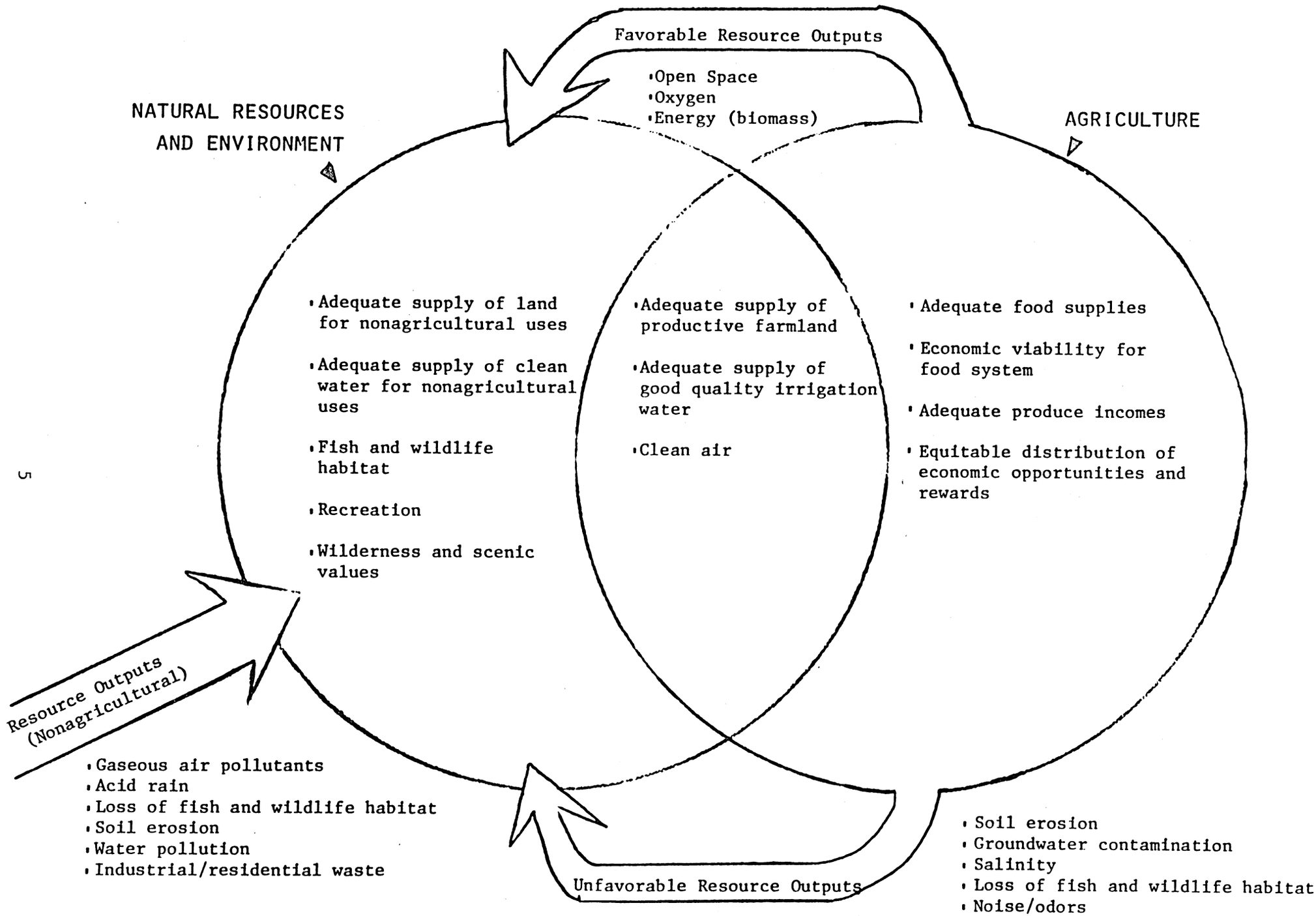
- The adequacy of resources for agricultural production
- The effects of agricultural production on resource and environmental quality

Libby describes the former as resource "input" issues, and the latter as resource "output" or byproduct issues (7).

The relationship between resource and agricultural issues is illustrated in figure 1. Within each circle are policy issues unique to natural resource and agricultural interests. Issues of mutual interest are shown in the area of overlap. Favorable and unfavorable resource outputs flow from agricultural production back to the natural resource circle. Nonagricultural sectors also produce resource outputs which affect agriculture. They are shown in the lower left hand side of figure 1.

Figure 1.-Relationships Between Resource and Agricultural Policy Issues

Figure 1.-Relationships Between Resource and Agricultural Policy Issues



With this background, let me review the resource issues addressed in the Agriculture and Food Act of 1981, talk about the setting and issue candidates for the 1985 bill, and conclude with some implications for research.

The 1981 Farm Bill

The 1981 farm bill agenda was heavily influenced by dramatic events in the 1970's and much uncertainty about the immediate future. The surge in exports of farm products during the 1970's, the return to production of over 50 million acres previously idled because of surpluses, and the unprecedented rise in the price of oil made resource adequacy the priority issue.

Conversion of farmland to nonfarm uses, soil erosion, and depletion of ground water supplies were major concerns, reinforced by data from USDA's 1977 National Resource Inventory. Because crop yields were not increasing as rapidly as in prior periods, the disappearance of our cropland reserve in response to higher foreign demand for farm products was further cause for concern. Agriculture and, as a result, resource adequacy also became intertwined with other national policy issues, such as economic growth, balance of payments, and foreign policy.

As the 1981 farm bill was written, foreign demand showed signs of softening. The worst of the oil crisis seemed to be over. But the question, will there be enough land and water, was still asked. Awareness that our resources, though abundant, were not unlimited was an important legacy of the 1970's. Resource adequacy concerns were voiced by the media and reaffirmed by results of a major USDA appraisal of the Nation's resources, required by the Soil and Water Resources Conservation Act of 1977 and released in mid-1981 (10).

Soil conservation and farmland preservation were the natural resource issues receiving the most attention in the 1981 farm bill. For the first time in farm bill history, a resource conservation title was added. It included the Farmland Protection Policy Act, a special areas conservation program, matching grants for conservation, a conservation loan program, and an endorsement of conservation tillage.

1985 Farm Legislation

The Setting

The setting for the 1985 farm bill differs from that of the 1981 bill in two critical respects:

- Concern about the adequacy of food supplies and resources to produce them has been overshadowed by crop surpluses and excess resource capacity. Farm policy attention has shifted to issues such as economic viability of the food system and financial stress on farmers.

- The market-oriented philosophy of the present administration and the current Federal deficit promise not only to influence the next farm bill agenda, but to place significant constraints on the choice of program options.

The Resource Issues

Soil conservation will likely dominate other resource concerns in 1985, as it did in 1981, but for different reasons:

- The rationale for soil conservation has broadened. While many observers do not now see erosion as an immediate threat to the Nation's agricultural productivity, longrun productive capacity remains an issue. It is joined by growing concern about off-site erosion damage to water quality in streams and lakes, and to fish and wildlife habitat. The cost of correcting damage from runoff and sedimentation in the United States, recently placed by the Conservation Foundation at between $2 and $6 billion a year (4), exceeds the value of future erosion-caused national yield losses estimated by scientists Crosson and Larson (6).

- The conservation movement, spurred by resource adequacy concerns a few years ago, and now turning more of its attention to other adverse effects of soil erosion, has the momentum to keep conservation on the legislative agenda.

- Farmers' current financial woes, brought on by surplus conditions, are giving soil conservation a new and different urgency. Many farmers are less able today to afford conservation measures or the increased fertilization to offset yield losses due to erosion.

- The belief that it is easier to conserve soil when erosive crops are in surplus is another reason why conservation may be stressed in the next farm bill. One hitch, certain to come out in the debate, is how to capitalize on this opportunity without adding to farmers' financial problems.

- In the eyes of Congress, resource conservation is unfinished business. The Conservation Title in the 1981 farm bill has never been fully implemented. Passage of the Soil Conservation Act of 1984, which reached the conference committee before the July 4th recess, could well be deferred, and its provisions considered for inclusion in the 1985 bill. The act includes a sodbuster provision and a conservation reserve program.

- Finally, soil conservation is a priority concern of the current Secretary of Agriculture.

Other natural resource issues have earned increased public attention since 1981. But unlike soil conservation, they are not apt to be dealt with directly through major farm bill provisions. Ground-water depletion is a continuing issue, more so today because of its effects on the economic well-being of irrigated farms. But water policy is awkward, especially for a farm bill agenda committee. The States basically control rights to water. The Federal Government has limited authority to deal with water use, costs, and transfers; the farm bill agenda committee has limited legislative jurisdiction under that authority.

Ground-water contamination from pesticides is a fast-growing issue. Public health and safety concerns beyond agriculture have placed it on the

agenda. And yet, like off-site erosion damage, contamination is not easily addressed directly through legislation. Benbrook, Crosson, and Ogg doubt that Congress will attempt to do so in the 1985 farm bill (1). We simply lack the ability to track and devise acceptable policy instruments for dealing with nonpoint source pollution in general.

Water salinity is yet another issue competing for attention. But while it is a serious problem in parts of Colorado, California, and Arizona, salinity is not considered a national issue on a par with soil erosion.

Resource outputs originating outside the agricultural circle in figure 1 likewise will be debated but not addressed in a definitive manner. Acid rain and gaseous air pollutants are a case in point. Knowledge of their effects on agriculture is still relatively incomplete. Policy approaches to minimize their damage have not been fully identified nor sufficiently debated. And, as with water policy, it is difficult for Congress to address problems like these which cut across two or more policy agenda committees.

Small farm problems, ownership of farmland, and the like--identifiable issues in recent farm bills--have received little if any attention in the current policy debate. The structure and control of agriculture are either not viewed as serious concerns by today's agenda committee, or they are felt to be best handled indirectly.

USDA Program Issues

The market-oriented philosophy of the current administration and our huge Federal deficit could affect not only the selection of 1985 farm bill issues but also, just as importantly, the way they are addressed. Two questions seem destined to flavor the 1985 debate: Can USDA and other Federal programs for agriculture be made more consistent with resource conservation? And, how can we get a higher payoff from all programs with reduced Government outlays.

Program Consistency. The consistency of USDA and other Federal programs with soil and water conservation--discussed in another paper in this symposium--is a prime candidate for consideration as a farm bill issue in its own right. The results of a special ERS study, now being reported, show that commodity and credit programs that encourage production of erosive crops have contributed to at least some of the Nation's excess erosion and, by implication, ground-water mining (9).

Agricultural and resource leaders at a Conservation Roundtable hosted by the Secretary of Agriculture in April 1984, and results of recent polls, support the principle that farmers should not receive benefits of USDA farm programs if they fail to practice soil conservation. Recent legislative action previews the farm bill debate on this point. The Soil Conservation Act of 1984, noted above, includes a sodbuster provision, denying USDA program benefits to farmers who plow fragile land. The administration favors passage of the sodbuster provision this year, and failing that, its inclusion in the 1985 bill (2).

Conservation cross-compliance applied to all crops and soils is less likely to be added to the farm bill for reasons suggested in a recent article by consultant Ken Cook (5): The uneven financial burden cross-compliance would impose on farmers; the skewing of program benefits to those who can easily

comply because they have relatively noneroding land; the risk that farmers who are unable or unwilling to comply would not participate in commodity programs--thus impairing USDA's ability to adjust production, raising the Government's cost of doing so, or losing from USDA program participant rolls farmers who might otherwise be helped to conserve their soil; and the obvious difficulties of setting and enforcing conservation standards.

However, lesser steps to ease program inconsistencies might well be considered by Congress, such as urging stricter USDA enforcement of groundcover requirements on land idled under commodity programs, discouraging loans to farmers who fail to practice conservation, and requiring multi-year commodity programs or timing program announcements so that farmers can adequately plan for conservation.

The Government's interest in program consistency goes beyond merely preventing inadvertent conflicts. It sees dollars saved in the process. For example, conservation outlays can be reduced if ways can be found to head-off erosion in the first place, including that encouraged by commodity and other programs. The administration's ultimate goal is to move to a more market-oriented policy; that is, to eliminate rather than correct for the adverse effects of commodity programs.

The adverse effects of tax policies on resource conservation are less likely to be addressed in the farm bill, even though the capital gains tax and investment tax credits apparently contribute to phenomena like sodbusting (11). One problem is that tax policy is not controlled by the farm bill agenda committee.

Program Cost-Effectiveness. The Federal deficit makes cost-effectiveness of agricultural and conservation programs a critical issue in the 1985 farm bill discussions. Two ideas now receiving the greatest attention from a cost-effectiveness standpoint are the long-term conservation acreage reserve and the targeting of technical and financial assistance.

From all indications, the 1985 bill is likely to authorize a long-term conservation reserve program. Unlike the old soil bank of the 1950's, however, the program would pay farmers to convert only erodible cropland to permanent grass cover or trees under 5-10 year contracts. Proponents of this approach see it as a way not only to save soil, but to reduce production of surplus crops at a cost to the Government well below that of acreage reduction under annual commodity programs. Initial results of ERS research on alternative acreage reduction schemes support this claim (12). The potential savings are greater if windfalls to farmers can be minimized by paying annual rental rates based on what farmers bid to retire land, rather than paying all the same rate.

Targeting of conservation programs to critical erosion areas, the second approach expected to receive farm bill attention, is already underway. It was initiated by the Department in 1982 as an important feature of its new National Conservation Program, partly in response to evidence that USDA technical and financial assistance did not always go to farmers with serious soil erosion. The debate is certain to center on the questions: Where to target, what criteria to use, and how much to target?

Finally, program cost-effectiveness concerns could stimulate considerable interest in other approaches with the potential of "killing two birds with one

stone." Conservation tillage is apt to receive continued legislative endorsement as a way to control erosion while reducing farm production costs. Its major drawback is the required increase in use of herbicides, which some argue will damage the environment as well as cut the farmer's cost savings.

Integrated pest management and organic or regenerative farming methods could be given more than passing attention. Organic farming, for one thing, is also unfinished legislative business. The National Agricultural Productivity Act of 1984, still pending in Congress, would set up organic farming research and demonstration centers in several areas. Just as producers have shifted to conservation tillage when it pays, many are changing their farming techniques to limit their use and costs of pesticides and manufactured fertilizers. Proponents of these alternative farming methods point out that if cost savings are greater than yield and revenue losses, not only is the farmer better off but the Government could face smaller and less costly surpluses.

Implications for Policy Research and Information

I see several implications of the foregoing discussion for policy economists:

- Current interest in the consistency between farm, resource, and other Federal policies calls for a broadening, if not integration, of traditional policy research. As a rule, farm policy specialists think of natural resources mainly as production inputs, while resource policy analysts are inclined to ignore commodity and other policies affecting resources. Both need at least a better understanding of each other's field to usefully analyze the relationships between traditionally independent policies. For example, to what extent would a long-term conservation reserve program in fact cut Federal outlays otherwise required to reduce surplus production? And, how much would Government costs of production adjustment rise under cross-compliance, due to lower farm participation in commodity programs?

- Resource economists need to build more economics into their policy research. Policymakers need valid estimates of the economic damage caused by various levels of soil erosion and other unfavorable resource outputs. Past policy studies have often been stymied by lack of data, even on the underlying physical relationships. That's changing. The USDA's National Resource Inventory and research tools such as EPIC (short for Erosion Productivity Index Calculator) now open the way for economists to build costs, returns, and policy variables into conservation policy research.

- Agricultural and resource policy analysts need to provide more complete information on policy benefits and costs. Policymakers want to know about the indirect as well as direct economic benefits and costs of policy alternatives, even if some defy measurement. They need to know who will receive the benefits and who will bear the costs. Examples: Would a bid system of retiring acreage under a conservation reserve program cost more to administer than a system of paying farmers the same rate per acre? How much more? What would be the distribution of benefits and costs of cross-compliance among farmers in different regions?

- Resource policy analysts should study market-oriented policy approaches. We need to shed economic light on the claims and counter claims surely to accompany consideration of less Government intervention. For instance, how would eliminating current commodity programs affect soil erosion? Where and why? How would full-cost pricing of irrigation surface water alter water use, conservation, farm income, and interregional crop production patterns?

- Finally, there will be life after the next farm bill. Our policy research must contribute to a better understanding of farm bill alternatives and consequences. But we have an obligation to also look beyond that event--to conceivable policy settings quite unlike that of today, to resource issues in addition to soil conservation which could be on tomorrow's policy agenda.

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LINKING NATURAL RESOURCE AND FOOD POLICY: IMPERATIVE OR IMPOSSIBLE?

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The natural resource dimension of food policy has received increasing attention in recent years. The 1981 farm bill included a modest section on soil conservation. Further attention is expected in the 1985 farm bill. Soil conservation experts within and outside of Government point to the unintended side effects of food policies as a major cause of excess erosion. Recent interest in regenerative agriculture, formerly known as organic agriculture, is largely a resource question. Scientists of all persuasions write about the possible resource limits of "high-tech" agriculture; some to sound the alarm, others to turn if off. To a resource economist who has languished in the obscurity of an agricultural economics department for many years, this is a welcome change. But I'm not sure I like all the competition.

Much of this new-found relevance for the resource part of food production and marketing policy can, I believe, be attributed to the Resource Conservation Act (RCA) process. The fact that some commodity programs encourage erosion was acknowledged and discussed in early stages of implementation of the Soil and Water Resources Conservation Act of 1977. These were not new arguments, but the scale and mix of actors in the RCA process added credibility to what had been said before. Academics in all areas seem to have opinions on soil conservation. Cross-compliance is now an accepted item on everyone's list of policy alternatives in soil conservation. It would <u>not</u> have been a politically acceptable idea 5 years ago. But policy changes in small increments and the very fact that cross-compliance is O.K. to discuss among soil conservation professionals indicates an important linking of resource and food policies. Farmers, whose rights may be most in jeopardy in a cross-compliance scheme, generally support the idea. I say "generally" because livestock farmers, who will be little affected, tend to be more enthusiastic than crop farmers. The Economic Research Service in USDA has the task of examining the soil erosion incentives inherent in a broad range of USDA programs.

Like most people, I support cross-compliance in principle. It is just good common sense to avoid designing two policies that generate off-setting incentives. But there are obvious limits beyond which this notion should not be stretched. A recent "think piece" from ERS talked about requiring an "erosion impact statement" for all federally funded research projects. Now <u>that</u> is unwarranted tampering with academic freedom!

The other major theme in the food/resources ballad is scarcity. The most recent rendition started with Global 2000 ("serious deterioration of agricultural soils will occur worldwide...An area the size of Maine is becoming wasteland each year") and was embellished by Lester Brown ("The world is moving from chronic excess of agricultural production capacity to chronic scarcity"), Ann Ehrlich and David Pimentel, and others. Much of this literature calls for fundamental reorientation of food production in developed societies to shift from fossil fuel dependency to sustainable or renewable energy sources. Regenerative agriculture is partly a political movement, a point of view about humans as a <u>part</u> of the natural eco-system, and position on who should bear

risks associated with alternative production technologies. The matter of size and distribution of farms gets into the discussion as well. The precepts of small-scale regenerative production technologies are less easily absorbed into the land grant doctrine than are issues of soil conservation policy.

Natural resources and food system issues are inextricably linked. What if anything should be done about that linkage is less clear. This brief paper considers the nature and extent of food/resource interrelationships, discusses the policy process that produces inconsistent decision incentives for key actors in this food/resource policy system, and offers conclusions about future policy.

Food/Resource Linkages

Agriculture may be defined as the controlled conversion of natural resources--air, soil, water, energy, nutrients--into products that people will buy. Thus, food is resources, and anything that influences how food is produced will influence how natural resources are used. We may consider natural resources as both inputs and outputs of the food system.

Resources as Inputs

Land is the fundamental production resource for food. It must be available in the right place, in an appropriate configuration for production. The human capital needed to produce crops on good land is the most crucial input. Economic returns per unit of land are likely lower in agriculture than in most other economic activities. Thus, policy actions which suggest to farmers the possibility of higher return per acre may distract them from the business of farming. Farmers like to be distracted, at least occasionally. Most will resist policies that make such distractions illegal (as in a zoning ordinance). And I would not argue for policies that force farmers to accept lower returns on labor and capital than might be the case otherwise. The problem is that many programs create the illusion of economic improvement, thus discouraging active farming without a real alternative.

Water is to some extent a substitute for soil, in the sense that irrigation can increase output per acre sufficiently to reduce quantity of land necessary to meet food demand. Various policies, like tax depreciation schedules and interest rate subsidies, designed to reduce risks and improve incomes for farmers, may encourage greater use of water and less attention to soil quality. Water policies based on the first come/first served principle, with no conditions on how water is used and no charge for its services certainly affect the location, structure, and character of the food system. Right to water is likely to be the food system natural resource issue of the next decade. Neither the riparian or prior appropriation system makes much economic sense. The major influence on water use in agriculture has been policies in another resource area--fossil fuel. Deep well irrigation requires cheap energy.

High-tech agriculture is energy expensive in many different ways. Fertilizers, pesticides, transport, and refrigeration systems so essential to a specialized agriculture depend on fossil fuels.

Clearly, natural resource policies focused on allocation and use of each of these inputs to agriculture directly impact on the food system. Similarly,

policies that affect how, where, or by whom food is grown will have important consequences on these natural resource inputs. This interrelationship is as fundamental as the production functions themselves.

Resources as Outputs

The food system also affects natural resources on the output side. Sediment, nutrients, and toxics that wash from a field create nonpoint pollution for downstream residents. Actions that influence the willingness of the farmer to invest in soil conserving practices will affect this output known as water pollution. Similarly, policy efforts to improve water quality will affect choices and incentives for the farmer, thus affecting costs and mix of commodities produced.

Farmland can be important wildlife habitat, often to the dismay of the farmer. Were it not for alleged damage to nearby corn fields, a measurable financial loss, the current program to "thin" the Michigan elk herd would not have been taken seriously. Organizations of hunters have often complained that the off and on nature of farm programs makes it impossible to maintain a pheasant or grouse population. They would like to see more consistent commodity programs from year to year. Hunters would also welcome programs that assure their access onto private farms, woodlots, and wetlands.

Farmland is widely recognized as a waste processor. Land and water have the inherent capacity to assimilate waste by providing a medium for bacterial action. Many communities and industries use farmland as a secondary treatment plant for liquid waste and sludge. Waste management policies may affect farmland use, and since only some crops are suitable for such land, farm policies affect output of this particular natural resource service.

During the depths of the energy crisis of 1974 and again in 1977, attention turned to the possibility of growing energy on farmland. The most recent news, however, is that the U.S. Department of Energy will not continue to subsidize the production of synthetic fuels. Scarcity is the real mother of invention. There were early predictions of dire consequences from meeting the national policy objective of producing 10 percent of our energy from biomass, including corn and other crops. Impacts on demand for farmland and the availability for food production would be enormous.

Farming produces various "disutilities" that become objects for policy. Any local zoning ordinance, housing code, water and sewer system, school financing decision, or economic development effort that influences where people want to live has immediate consequences for the food system. Noise, odors, and various attractive hazards are resource-related outputs of agriculture. Rural development policies that help people move out to rural farm areas are inconsistent with other policies designed to increase intensity of production.

Links between resources and agriculture and between the policies for each are everywhere. In fact, there may be no policies that do not overlap. It is the classic lament of the systems scientist and the college sophomore that "everything is related to everything else, for goodness sake!"

Insights from the Policy Process

As any student of policy knows, all of policy is incremental. Some say that is the problem and that we should have coordinated, comprehensive policies. I suspect that comprehensiveness is like economic efficiency or pareto optimality--a goal to be dreamed about but never achieved. The effort to account for cross-purposes is certainly worthwhile, though can never be totally successful. There is simply too much momentum the other way, toward Lindblom's notion of fragmented incrementalism. Policies and programs emerge from a bargaining process undertaken by people with particular axes to grind. All of us are guilty of myopia brought on by the real intellectual limits of most human beings. The few people in the world who really can transcend the boundaries of human perspective aren't likely to waste their time writing coordinated food policy. Incremental policy is an inevitable product of our highly specialized society. The incremental specialized, symptomatic aspect of policy is reinforced by the interest groups, professional organizations, even the disciplines that provide the organizational fabric of our society. People specialize, and one's speciality becomes an identity, a point of view to be defended. Economists distinguish themselves from sociologists, and of course there are many subspecialties within disciplines. Water resource specialists of many disciplines write for different journals and attend different professional meetings than soils people or food policy specialists. There are few joint memberships between the Society of American Foresters and American Agricultural Economics Association. The Secretary of Agriculture in USDA who worries about price supports is not the person who listens to soil conservation proposals. Even in the classroom, we teach things in pieces. The limits of a 10- or 15-week semester are a real crutch to faculty accustomed to dealing with fragments. We deal with the complexities of the world by specializing in a piece of it. It is not a preconceived normative model, but a response to reality.

What does all of this mean for linkages between natural resource and food policy? It means that we will always live in a fragmented world and wringing our hands about lack of coordinated policy will produce little more than frustration. In our reasonably pluralistic society, public actions are undertaken to deal with specific problems that are identified and communicated by those affected. This reality should not, however, be used as an excuse to avoid seeking policy improvements. There is no inherent virtue in a muddled policy mix. I offer the following general guidelines for participation by economists in food resource policy development:

1. We need to understand the myriad of incentives facing the key participants in the food/resource system, and how policies shape those incentives. Actions and inactions by thousands of farmers determine performance of this policy system. Other people are involved, of course, but farmers are at the heart of it. I feel that we need a careful and systematic analysis of the whole complex of incentives that push and pull at the farmer as a manager. We have focused on specific policy inconsistencies, but have not adequately charted the full system. We have developed theories of behavior, we talk about decisionmaking under uncertainty, and have empirically observed how managers respond as entreprenuers in specific decision situations. But we need some diagnostic work to better understand the setting within which farmers make choices. Many of the incentives are the deliberate elements of policies: for selection of crop to plant;

when, how, and where to plant; how to pay for it; investment strategy, including tax advantages of certain products or farm organizational models; for deciding where to live; and the role of community in farm life. Other incentives affect these same actions, but as a byproduct of other policies: domestic content legislation, immigration, environmental, economic development incentives, and policies that encourage investment in agriculture for overall economic growth.

My point is that we should start from the decisionmaker who deals with resources and food and probe out into the uncharted wilderness to more completely understand the incentive structure within which that individual operates.

2. We need more definitive analysis of the performance consequences of particular food and natural resource policies. What do these programs really do? Our farmland preservation program in Michigan is really a tax program that shifts the burden from farmers to other taxpayers. The apparent hope is that if farmers have lower income taxes, they will be less inclined to sell the farm and go to Flint to make Buicks. We have no real indication that land use patterns are changed because of this program. Neither do we understand how the tax shifts affect behavior of other actors in the system. Perhaps urban development is relocated in fragile areas that cause resource degradation.

I am aware of the realities of policy development. We cannot expect full information prior to passing a new law for dealing with a particular problem. But I'd like to see a modest effort, perhaps based in a university, to scrutinize policy proposals, seek clarity of purpose, and anticipate performance. Perhaps this is ERS's new role in Washington. Analysis of performance should be required of laws in place, with emphasis on the incentives which those programs generate for actors outside the target clientele. Many laws and proposals are poorly conceived, with no hope of achieving the legislative statement of purpose.

3. Effort to root out blatant inconsistencies among food and resource policies is worthwhile. American taxpayers should not have to put up with obvious instances where we create a problem with one incentive program and solve it with another. We need to set priorities, deal with cases that are logically interrelated, and not be paralyzed by the obvious fact that interrelationships exist everywhere in policy. Special care must be taken to avoid diluting or mixing the incentives of programs to the point that they are ineffective. We may end up with nicely integrated programs that solve nothing because they are too diverse or inclusive to be useful. Since other papers at this session address the opportunities in this area, I will not elaborate further.

I personally feel that cross-compliance strategies in soil conservation policy are headed in the right direction. They won't solve the erosion problem, but may not make it worse. I see no reason to reward farmers for destroying long-term productivity of soil.

4. Policy economists should be directly involved in policy design and implementation. The conceptual apparatus and analytical content of

economics can help develop policies that work. Economists should be participants, not just observers or gadflies, but a part of the policy apparatus in Federal, State, or local government. They need to be in agencies subject to all of the posturing and bargaining inherent in any bureaucracy. One has to be part of something to really be credible.

Part of the economists' role in policy is to ask why, to help think through the logic or rationale of public action to solve a particular resource/food problem. That question has been asked in soil conservation and responses have been difficult to formulate. In my judgment, government's chief role on the input side of the relationship between natural resources and the food system is to absorb risk of inaccurate information about natural resource scarcity. We know that individuals make decisions with reference to future needs, but the social consequence of misjudging the role of exhaustible resources in future production functions could be far greater than the private consequence. Government is our conscience in resource conservation. In cases where food production causes unacceptable reductions of resource quality, government's role is to reassign rights and generate incentives to cause a change in action sufficient to alleviate the problem. The purpose of a change in policy needs to be spelled out clearly and honestly. We should not assume that government decisionmakers are always better informed than private ones, but only that government should be more risk averse in cases where dire social consequences would result from being wrong.

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SOIL CONSERVATION ISSUES AND FARM LEGISLATION

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Program Consistency and Soil Conservation

Recent concern within and outside USDA has focused on consistency between USDA's many programs. That concern has been specifically directed to the relationship between USDA commodity price and income support programs and its soil conservation efforts. The Economic Research Service was directed by the Resource Conservation Act (RCA) process to evaluate the consistency problem. That evaluation, which has been completed, has several policy implications for the 1985 farm bill discussions. The results of the ERS effort and related studies will be discussed first and the policy implications will then be summarized.

Conceptual Links Between Programs

Commodity price and income support programs are designed to improve prices, support or raise farm income, and to stabilize farm income (7). Improved and stabilized farm income should make it easier for farmers to afford conservation investments. Expectations of farmers that prices will continue to be good should make them more willing to commit resources to longer term investments. If future prices are more uncertain, farmers are more likely to place a higher discount rate on future returns. Higher discount rates tend to work against conservation. On the other hand, stabilized and higher prices may encourage development of more marginal lands. If the marginal lands are more erosive, then the farm programs could encourage erosion. Which effect is the strongest is an empirical question that has not been adequately addressed.

A more subtle impact on soil erosion could occur due to relative price changes. Commodity programs, conceptually at least, raise prices of the crops covered. Program crops tend to be more erosive than many of the nonprogram crops, soybeans being a notable exception. This indirect effect through prices may potentially be the most damaging. The price effect applies to all farmers who produce a given crop, not just those who participate directly in commodity programs. The effects, therefore, are more widespread.

Some programs such as subsidized crop insurance and disaster payments are designed to help stabilize income. They provide protection in areas that may be prone to frequent disasters thus encouraging continued crop production in those areas. If these areas are also highly erodible, then the programs have again affected soil conservation.

Empirical Evidence of the Linkage

USDA Consistency Study: Land can be classified in many ways. The class/subclass system followed by the Soil Conservation Service is familiar to most of us. While that system is useful for many purposes, other systems may be more helpful in determining erosion potential. Using data from the National Resources Inventory for 1977, Bills and Heimlich (1) classified land

subject to sheet and rill erosion according to its erosion potential and the manageability of that potential. They developed four erosion classes:

1. Highly erosive. This is cropland that erodes above acceptable rates ("T" or tolerance for their analyses) no matter what management practices are followed. The only way to reduce erosion to "T" on this cropland is to convert it to permanent cover.

2. Moderately erosive. Managed so that erosion rates exceed "T." Proper management could reduce erosion to "T" or below on these lands, but present management is such that erosion exceeds "T."

3. Moderately erosive. Managed so that erosion rates are at "T" or below. Same as 2 but proper conservation is applied.

4. Nonerosive. Soils in this group inherently erode at rates below "T."

Figure 1 depicts the relative percentage of U.S. cropland that fell into each of the above soil groups, according to Bills and Heimlich. It also depicts the percentage of sheet and rill erosion that came from each category. Over 70 percent of the total sheet and rill erosion came from only 23 percent of U.S. cropland.

Row crops tend to be more erosive than other crops. For the four erosion classes of land, figure 2 shows the proportion of row crops to nonrow crops that existed in 1977. The lands on which erosion exceeded 5 tons per acre per year had well over 50 percent of their use devoted to row crops. Over 75 percent of the moderately erodible lands managed above 5 tons of erosion per acre were used to produce row crops. Only about 40 percent of the less erodible lands were devoted to row crops production.

Reichelderfer (8, 9) studied farms in the highly erodible areas of the United States (fig. 3). Erosion for over 2,800 sample points in 68 counties was determined from the 1982 Natural Resources Inventory. These points were then related to various characteristics of the operators who managed the land containing each point. One of the major goals of this effort was to see if there is any apparent relationship between USDA program participation and erosion. Figure 4 shows that the relationship is at best weak. Those participating only in commodity programs had a higher percentage of their land eroding at greater than 5 tons per acre per year than did those in any of the other categories. However, when crops produced on that land were taken into account the differences disappeared. Nevertheless, participants in USDA programs were contributors to erosion.

Reichelderfer (8) concluded that 50 to 75 million acres of U.S. cropland (11-18 percent) that erodes above 5 tons per acre per year are operated by participants in USDA commodity and/or conservation programs. But, 70 to 95 (16-22 percent) million acres eroding at similar rates are operated by those who did not participate in USDA programs. USDA program participants farmed 30 to 70 million acres in such a way that erosion was at or below 5 tons per acre per year.

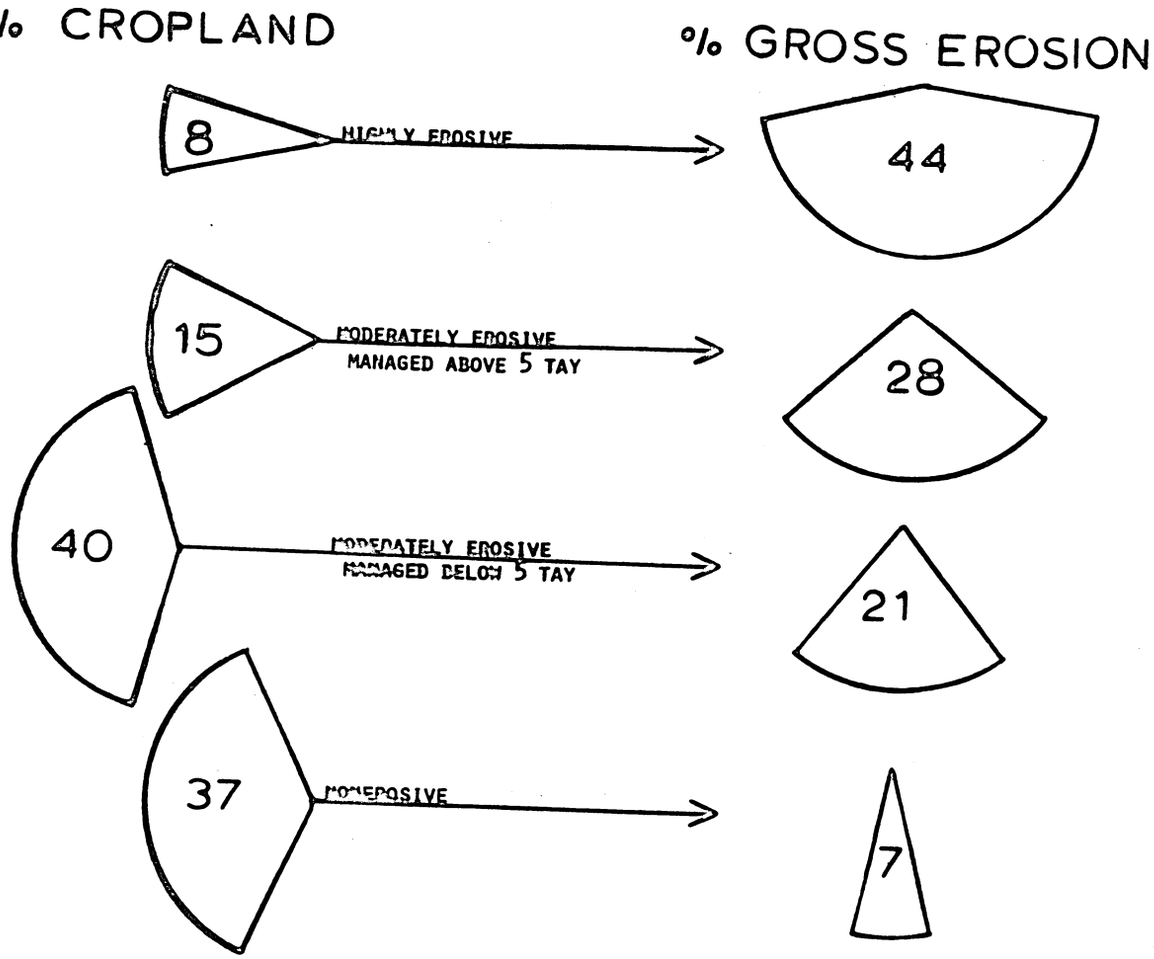


Figure 1. Relationship between cropland erodibility and gross sheet and rill erosion (1).

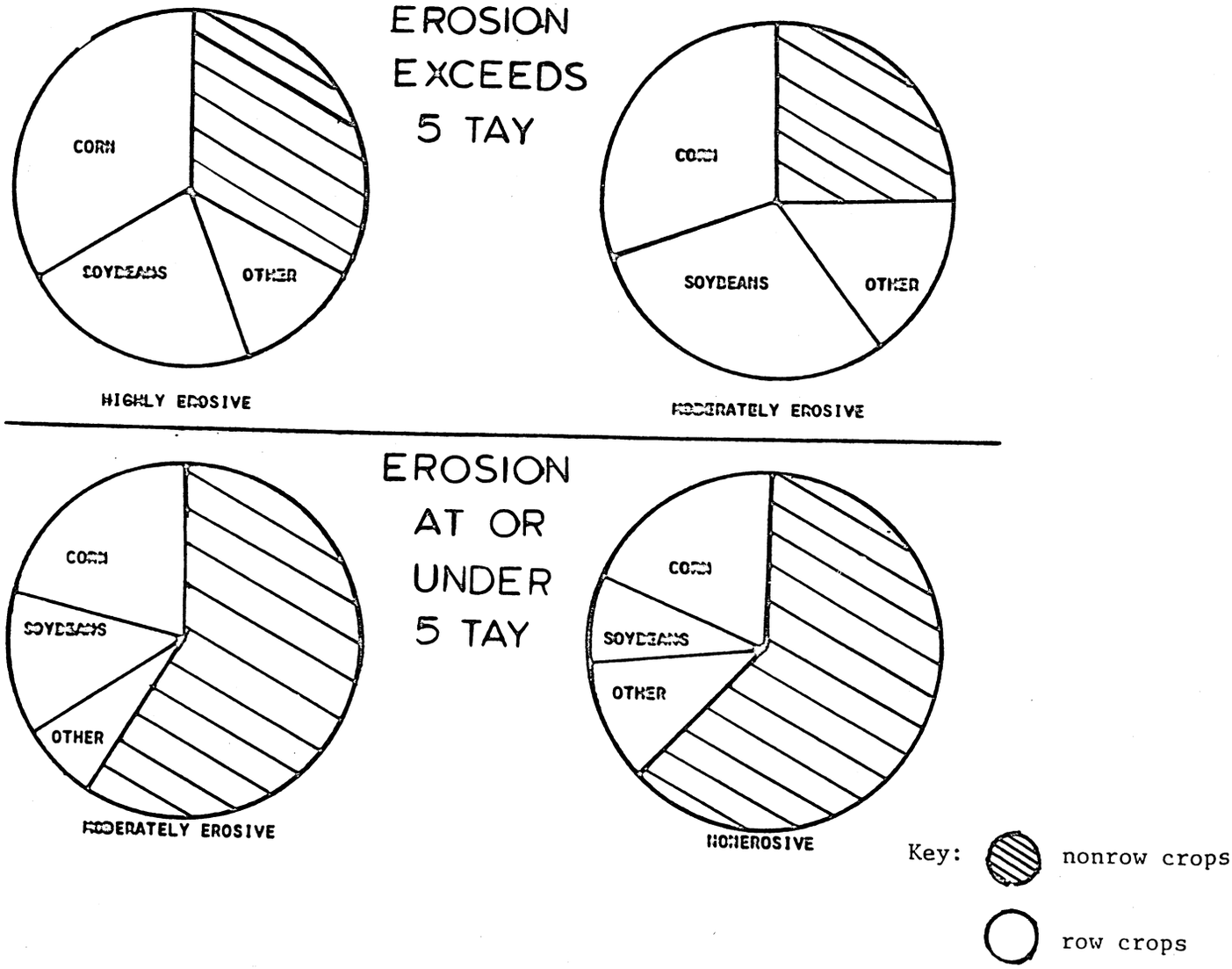
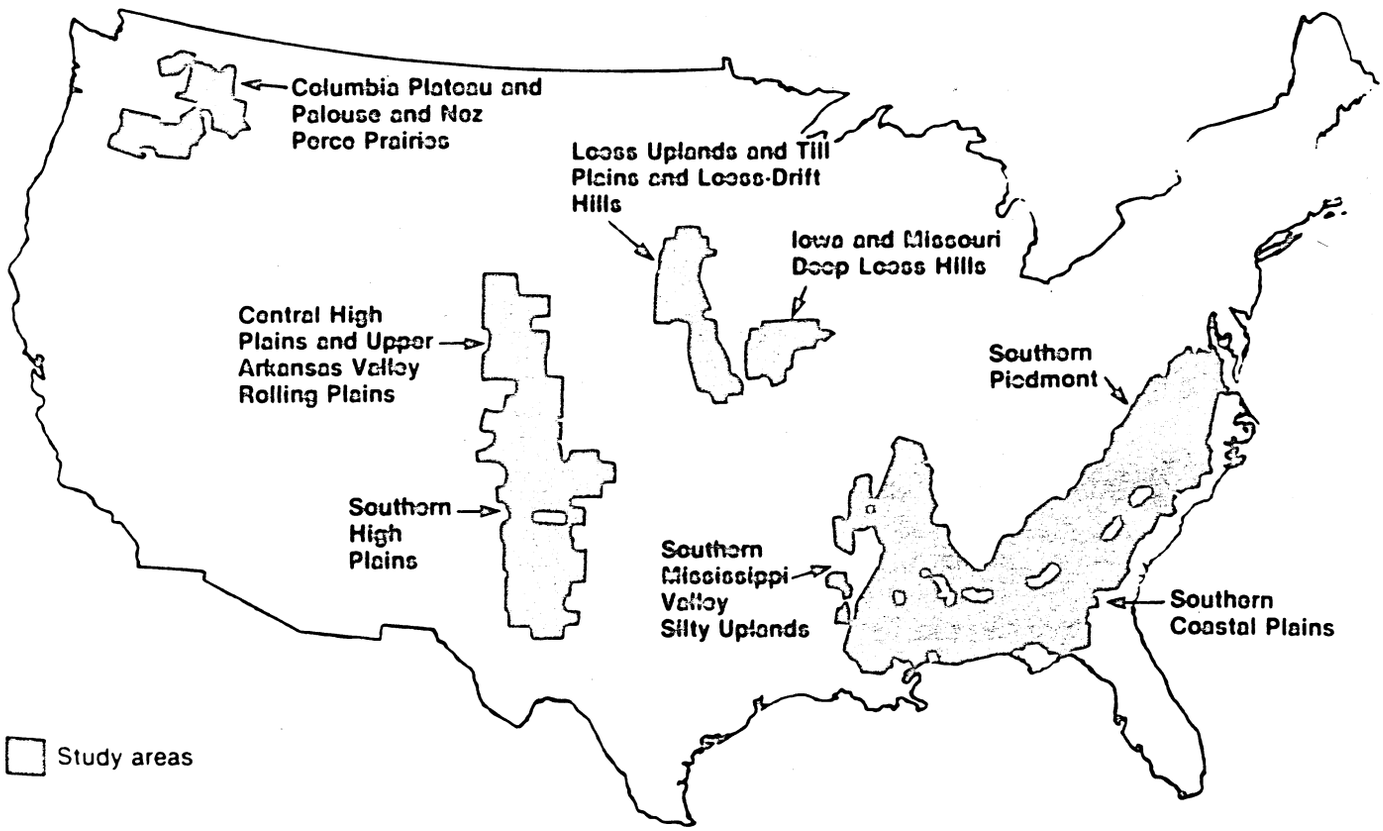


Figure 2. Row crop production by land group (1).

Figure 3.

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



Note: Study areas are delineated by boundaries of selected, SCS-designated Major Land Resource Areas.

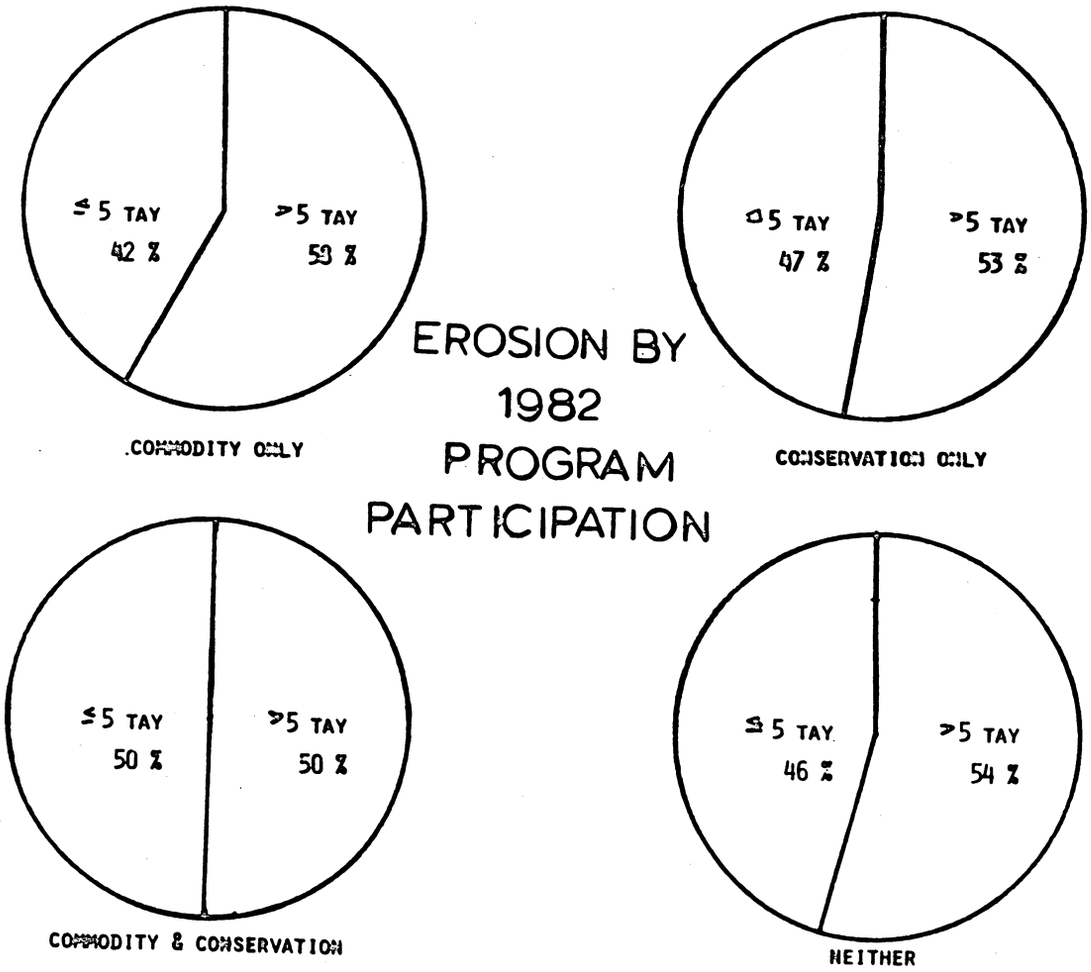


Figure 4. Proportion of operators with land eroding above and below 5 tons per acre per year in 1982.

Several implications can be drawn from the above analysis:

1. There are two distinct types of erosion problems that may require different policies and treatment for solution. One problem is erosion from the highly erodible soils that can be controlled to tolerable levels only by conversion to permanent cover. The second is erosion from the moderately erodible soils presently being managed in ways such that erosion exceeds "T."

2. Commodity programs may increase production of program crops relative to nonprogram crops. Since these crops tend to be more erosive than those not covered, the programs may aggravate erosion.

3. Nonparticipants in USDA programs operate relatively more of the erodible land than do participants; consequently, cross-compliance type requirements will not directly affect the majority of the erosion problem areas.

4. Almost as many commodity and conservation program participants farm land at erosion rates below "T" as do at rates exceeding "T." Policies and programs must be careful not to reverse this situation.

5. Participants in USDA programs do operate on lands with erosion rates exceeding "T" so there is potential for improving soil conservation and program consistency within this group of farm operators.

Empirical Evidence from Other Studies: Some research indicates that the commodity programs have raised program crop prices and have thus benefited nonparticipants. Johnson and Short (5) indicated that 70 percent of indirect (price improvement) benefits of the 1978 corn acreage reduction program in selected Southern States were received by those who did not participate in the set-aside. Gardner (4) estimated that farm programs increased prices received by farmers by 6 percent in the 1978/1979 period. Participants and nonparticipants alike benefit from these price effects. Participants also receive direct payments, but they give up income on lands set-aside. In 1978, 40 percent of the wheat was produced by farmers who did not participate in the set-aside programs. About 60 percent of the corn was produced by nonparticipants (5).

While the above studies support the concept that commodity programs have influenced prices, a recent Congressional Budget Office analysis (3) argues that the farm programs are becoming less effective in terms of supporting prices and reducing income variation. The analysis argues that the macroclimate surrounding agriculture is overshadowing our farm programs. The world markets and interest rates are two elements influencing farm income that seem to be beyond the control of our present farm policies.

Ogg, Webb, and Huang (6) argue that the USDA disaster payments program has been a major factor in the increase in cotton production in the Texas High Plains. Disaster payments to cotton growers in Texas averaged over $11 per acre per year between 1973 and 1978. Wind erosion on these Texas cotton acres averages over 30 tons per acre per year. The disaster program has been phased out but is being replaced with crop insurance. Crop insurance premiums are subsidized. The effect of insurance might be similar to disaster payments.

Implications for 1985 Farm Legislation

The previous sections reported on studies that have implications for conservation policy and USDA program consistency. First, there is some empirical evidence that farm commodity programs have increased prices for program crops. Since such crops tend to be more erosive than nonprogram crops, this indirect effect could be inducing more erosion. Regional production patterns appear to have been influenced by programs such as disaster payments. The lands operated by participants in USDA commodity and conservation programs do contribute significantly to the overall erosion problem. Yet, nonparticipants in these programs are larger contributors to the problem. Cross-compliance type requirements may improve program consistency, but such requirements are not a panacea for our erosion problems.

The types of policy and program options implied by the previous sets of conclusions can be grouped into four categories: (1) removal of commodity specific programs, (2) conservation reserves for reducing surplus production, (3) cross-compliance, and (4) improved implementation of existing programs.

Since commodity programs seem to influence relative prices, what would happen without them? ERS is examining this option. The impacts on erosion from projected changes in the quantities and prices of crops produced are being studied.

One of the primary features of farm programs has been acreage retirement or set-asides to reduce quantities produced for specific crops. Altering that program by targeting to specific lands and/or changing the method of encouraging participation may help achieve commodity and conservation goals at reduced government costs. While broad, across-the-board cross-compliance may not be a panacea for erosion control, it still offers potential for making marginal improvements. It also would make a major contribution towards the goal of program consistency.

Many of our existing programs and policies appear to have more potential than is being used both for controlling erosion and for improving consistency. USDA's recent study of the conservation effects of PIK (10) demonstrates this latter point.

Other more specific proposals will be debated during consideration of the 1985 farm bill. Many of these specific proposals will fall in the categories above. Sodbuster proposals which will undoubtedly reappear are in reality narrowly defined cross-compliance type policies. The atmosphere is good for assisting soil conservation, especially if proposed solutions have low price tags.

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SOME IOWA EXAMPLES OF INCONSISTENCY BETWEEN SUPPLY CONTROL AND CONSERVATION PLUS SUGGESTIONS FOR IMPROVED CONSISTENCY

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Iowa provides a good opportunity to evaluate the consistency between erosion control and supply control programs. It is a major producer of corn and soybeans, and has more total tons of sheet and rill erosion than any other state. According to the 1982 National Resources Inventory, Iowa has about 7 percent of the Nation's cultivated cropland. But the State is the source of over 10 percent of the total tons of soil eroded from cultivated cropland, and close to 14 percent of rainfall induced sheet and rill erosion from cultivated cropland. The per-acre rate of sheet erosion from cultivated cropland in Iowa is 9.6 tons per year, twice the national average. Approximately 75 percent of the cropland erodes at an annual rate greater than t (5 tons/acre).

Within Iowa, 58 percent of the excess erosion occurs on a mere 1.9 million acres. Approximately 7.6 percent of Iowa's cropland could be retired as it erodes at a rate of over 30 tons per acre and produces relatively little grain at a high cost.

Conversion to grass is not induced by market forces. Precisely the opposite is true. Public programs to reduce corn acreage do attract a disportionately large share of steep land, but not all of it. Paid land retirement does not always reduce erosion. Soil erosion programs, even when cost shared, have no economic incentive if they reduce net returns to farmers. In balance, erosion control programs have not reduced total grain output in Iowa.

This paper examines three examples from Iowa which provide insight on the issue of consistency between erosion control and supply control programs: the USDA feed grain and set-aside program; sodbusting in southern Iowa, and the USDA Acreage Conservation Reserve Program.

Feed Grain Set-aside Program

From a sample of 130 farms representing about 3 percent of the land of the Ida-Monona Soil Association (fig. 1), we identified all the fields diverted from corn in 1982 and 1983 to the Conservation Use Acreage Reserve. We then measured and classified all the acres by slope, degree of previous erosion, and soil type. The tabulation indicated that farmers who participated in the 1982 and 1983 feed grain program retired land that was more sloping, had more previous erosion, was lower yielding, and more erosive than average cropland of the area (tables 1, 2, and 3.). In this hilly deep loess area, about 44 percent of the cropland slopes from 10 to 20 percent, but 53 percent of the land diverted by our sample of farmers sloped 10 to 20 percent (table 1). If the farms were terraced, the fields were relatively homogeneous. But most of the fields in our sample varied considerably in slope internally. As a whole, the farmers in our sample retired fields that contained about 20 percent more steep land and 20 percent less nearly level land than the average composition of cropland in the area.

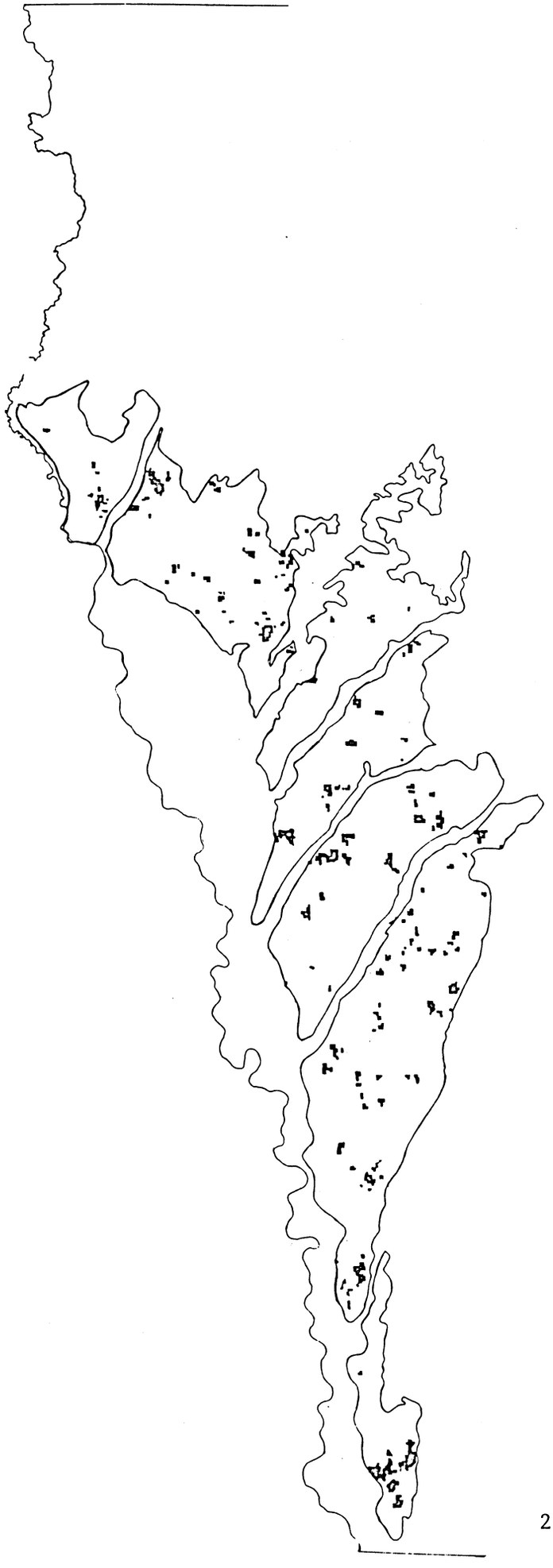

Figure 1. Spatial Location of Sample Farms in Western Iowa Deep Loess Hills.

Table 1--Slope distribution of acres diverted by a 3-percent sample of western Iowa farms

Slope group	Slope range	1982 diverted acres	1983 diverted acres	SAA 19,20,23 total acres
	Percent		Percent	
A	0-2	2.7	3.6	5.3
B	2-6	173	176	20.6
C	6-10	18.5	20.5	21.3
D	10-15	31.2	29.2	24.6
E	15-20	22.0	23.6	19.8
F	20-30	7.8	5.0	6.9
G	30-40	.5	.5	1.5

Table 2--Previous erosion on diverted soils of western Iowa

Degree of erosion	1982 diverted acres	1983 diverted acres	SAA 19,20,23 total acres
		Percent	
1. Little	30.0	32.5	40.6
2. Moderate	32.2	27.6	28.1
3. Severe	37.8	39.9	31.3

Table 3--Yield and erosion of frequently diverted soils in western Iowa

Soil series	Slope range	Previous erosion	Portion of 1982 and 1983 diverted acres	Corn yield	Soil loss
	Percent		Percent	Bu/acre	Tons/A/year
Ida	15-20	Severely eroded	15	54	140
Monona	10-40	Moderately eroded	13-18	79	60
Ida	10-14	Severely eroded	9-12	68	70
Monona	6- 9	Moderately eroded	8-10	90	22
Napier	2- 6	Not eroded	5-8	105	4

Diverted acreage had relatively more erosion than the average in the study. About 31 percent of western Iowa cropland is already severely eroded, with subsoil exposed. But among the diverted acres, 38 to 40 percent were severely eroded (table 2). Relative to the degree of erosion in the study area, the fields selected for diversion contained about 25 percent more "severely eroded" acreage, and 25 percent less "little eroded" acreage.

In this area, most of the fields on each farm are regularly row cropped. Thus, most fields qualified for retirement, and farmers had a wide choice of fields. The 1983 PIK was the same for each field on the farm regardless of the quality of the land. Farmers logically selected the fields which involved the least sacrifice in production. The steep eroded soils were chosen because they are well known to yield relatively poorly (table 3). Selection of steep fields also tended to minimize production cost.

After the erosive acres were selected for diversion, however, they were only partly covered with good cover, as indicated in table 4. As a result, land diversion in 1983 in western Iowa reduced erosion very little below what it would have been with more corn. Only about 1 diverted acre in 7 was planted early to a good vigorous stand of small grain. Early oats with over 10 inches of dense growth by late May have a "c" factor 1/ of 0.11 for June compared with 0.55 for a conventionally tilled crop of corn. Most of the PIK acres were either seeded late, had a poor stand, or were not seeded at all in 1983. The "c" factor for cover on diverted acres was generally equal to or larger than what it would have been in corn. The selection of land was consistent, but the protective cover applied was inconsistent with supply and erosion control goals.

Sodbusting

Another example of inconsistency is sodbusting in southern Iowa. Although the current excess capacity is very visible in grains, the net return per acre from corn has been supported and hence has decreased less than the net return for pasture in cow-calf enterprises in southern Iowa. Beef cows on pasture give a very low rate of return to capital. The high interest rate during 1981-1983 and the low prices of meat, especially chicken and pork based on cheap grain, has made beef cows unprofitable and emptied many southern Iowa pastures. As a result, sodbusting on side slopes in southern Iowa is occurring rapidly. Corn and soybeans are replacing grass because they require less borrowed money than livestock production and increase net returns per acre. Such responses seem perverse because they not only increase erosion but also increase surpluses and the tonnage of meat. The reverse of sodbusting, cropland conversion to grass, would reduce the total volume of feed, control erosion, raise farm prices, and lower energy and fertilizer consumption. The Shelby soils on side slopes in southern Iowa are very vulnerable to erosion (fig. 2). This example increases supply and also erosion as a response to excess capacity in agriculture.

1/ The "c" factor is a component in the Universal Soil Loss Equation. It is the cover and management factor, the ratio of soil loss from an area with specified cover and management to that from an identical area in tilled continuous fallow.

Table 4--Estimated 1983 cover on diverted acres, Iowa

Percent		
	Spring	
14	Established forage crop	- good cover
14	Seeded early	- good stand
14	Seeded early	- poor stand
42	Seeded late	- no cover
16	Not seeded	- 2/3 no cover
100		
	Summer	
11	Disked in July	
22	Mowed in July	
67	Weeds standing	
100		

Table 5--Acreage eligible and acreage contracted for conversion to grass cover through the 1984 Acreage Conversion Program and estimates of total conversion needed

County	Eligible[1/]	ACR[2/]	Need[3/]
		1,000 acres	
Clayton	12.8	0.5	20
Delaware	2.5	.1	8
Woodbury	45.8	.4	80
Iowa	43.3	.6	29
Appanoose	8.2	.5	15
Ringgold	8.4	.9	20
Mahaska	57.3	.2	50
Wapello	10.6	.1	35

1/ Area in 1,000's of acres classified as IIIe or more erosive, according to county soil survey.

2/ Cropland acres in 1,000's contracted by participants to convert in 1984 to permanent grass cover.

3/ Total county acreage estimated by SCS to be in need of conversion from cropland to permanent pasture. Differences between the "Eligible" and "Need" columns are due to program definitions of a problem and local assessments.

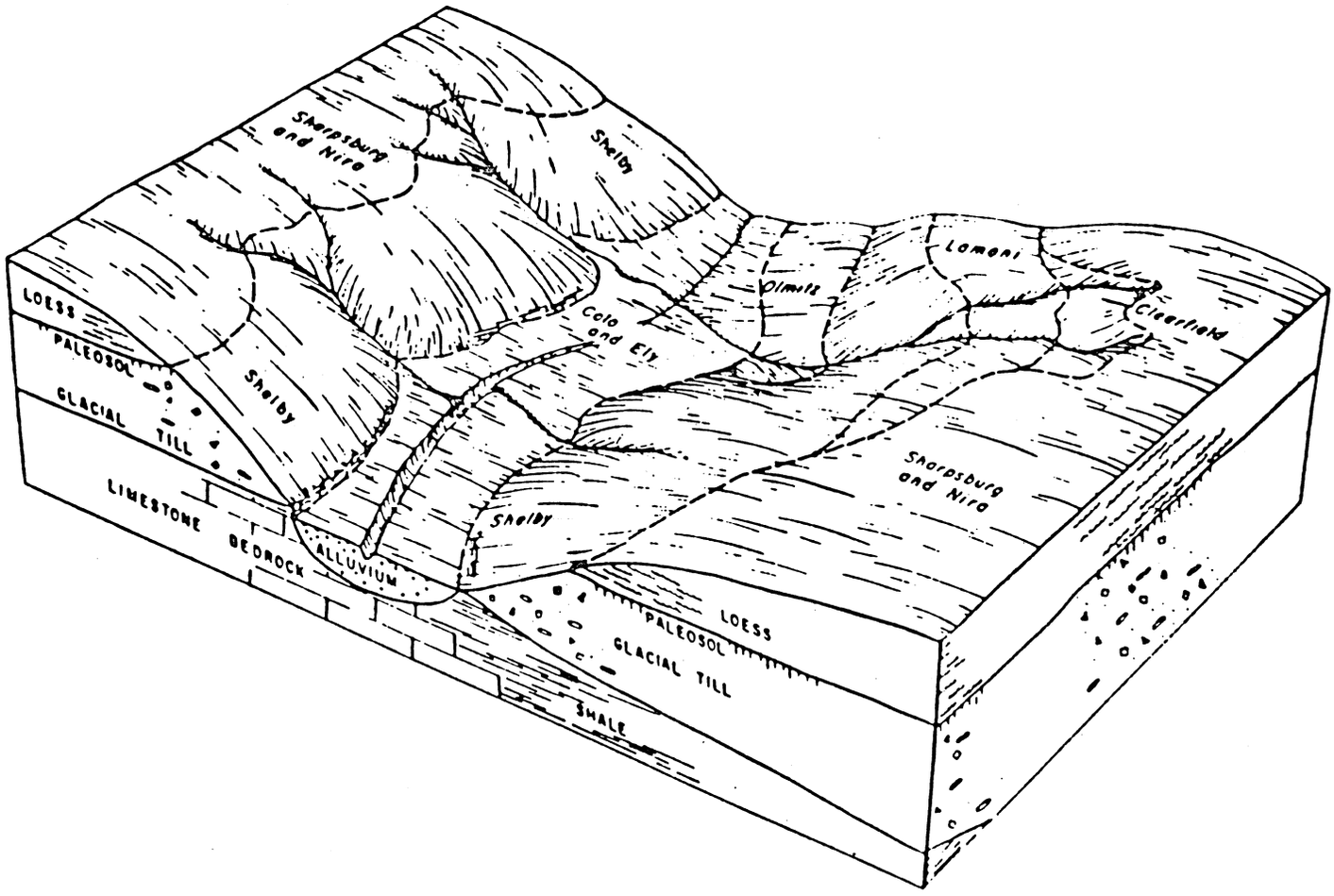

Figure 2. Southern Iowa Landscape.

Acreage Conservation Reserve

USDA initiated a special 1984 conservation program which offered increased incentives to establish permanent vegetative cover on land designated as Acreage Conservation Reserve (ACR) under 1984 commodity programs. The grassland conversion provision of the legislation (ACR-1) provides 90-percent cost share to convert erosive cropland to permanent grass cover. This program is a direct attempt to bring consistency between supply control and erosion control policies, but is a small and temporary effort. Preliminary results indicate that the needs for conversion estimated by county soil conservation specialists are much larger than the volume of 1984 contracts signed (table 5). The acre volume of 1984 ACR contracts is small relative to the crop acreage of land class IIIe and above in each county. Most of the IIIe and above land is currently in crops and eroding at a rate more than twice the tolerable level. The cropland conversion task in many Iowa counties is enormous and the ACR program is very small.

Suggestions

There are supply control techniques available which are more consistent with conservation than those in use in 1983 and 1984. Soil erosion exhausts a stock resource, top soil. Supply control during these surplus times should not only control excess production but also reduce the depletion use of stock resources. It is foolish to use stock resources to produce negative social value in surplus. I suggest the following changes in supply control. The first two could be implemented administratively without legislation.

1. Set both soybean and feed grain bases by land capability class and subclass. Currently planted acreage permitted by participants is determined by free choice for soybeans and by cropping history for corn. Permitted acreages are set by Agricultural Stabilization Conservation Service (ASCS) without regard to the capability of land to sustain intensive row cropping. As a result, farms that use soil conserving practices have small bases. Sodbusting leads to increased bases and later to large diversion payments.

2. Establish program yields for individual soil mapping units rather than by whole farm production history. Discontinue current practice of uniform yields for a whole farm. Most farms and fields contain several soil mapping units. Each has a predictable yield, but fields have widely varying yield potential. Program yields should vary among fields of the same farm. Computers could easily calculate a weighted average for each field. Combining specific yields assigned to individual soil mapping units would provide more accurate yield potential.

3. Divert acres from corn to a crop less productive and less erosive but crop all land each year. Limit corn and soybean acreage but not oats and grass. Offer annual payments for reduced intensity as a percentage of program yield. A low percentage of about 20 to 30 percent would attract marginal land but should be offered only on erosive land because retiring swamps and flood plains do not conserve a stock resource.

4. Assess monetary damages for excess soil erosion. Charge landowners a land depletion tax and off-site damage tax at a fixed rate per ton of soil eroded. The bill would be sent for total excess erosion after each severe storm. Farms could buy insurance (or post a bond) to pay damages. About $3 per ton would reduce the profitability of intense row crops on most steep Iowa land below the return obtainable from crops and practices with tolerable soil loss. An actuarily sound erosion insurance premium would vary according to tillage practices and cropping system.

A FINANCIAL PERSPECTIVE OF SOIL EROSION

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In many respects, it is difficult to talk about natural resource issues without taking a long-term perspective. The onfarm impact of soil erosion is seen in this way. As Schaller pointed out, "While many observers do not now see erosion as an immediate threat to the Nation's agricultural productivity, longrun productive capacity remains an issue." Off-farm effects of soil erosion (sedimentation and water pollution) are seen as a short-term political issue. These effects, however, accumulate over time and the costs are generally perceived in the long term.

Why do I raise this long-term/short-term delineation? The reason is because many of us as natural resource economists tend to see issues in a long-term context. Farm legislation in 1985 is, by contrast, likely to be considered primarily from a short-term perspective. This stems from the present financial position of both farmers and government. It is the financial status of farmers and the influence of exogenous economic forces on agriculture that I want to discuss.

Much has been written in recent years on the financial health of a sizable part of the farm sector. Following the boom years of the midseventies, macroeconomic and political forces have substantially changed the economic environment in which farmers must operate (6, 7). Many farmers have found themselves in financial difficulties and this has had, and will continue to have, a major impact on soil erosion. The disastrous soil erosion of the twenties and thirties was due not only to natural forces, but also to financial forces. Although outstanding farm debt fell during the period, farm asset values dropped faster with the ratio of debt to assets peaking at 30 percent in 1933. Farmers simply could not afford to be concerned about long-term soil productivity. They had to maintain cash flows to continue controlling their farms. In some respects, we face a similar situation today.

McConnell (2) has presented a model which is useful in seeing this connection. His model essentially considers the relationship of economic rents and resale value to the farmer's implicit decision to erode soil. The model is based on an optimal control formulation in which the objective is to maximize the present value of economic rents occurring over time plus the present value of land resale at the end of the time period, given a set of soil constraints. From this, McConnell derives a differential equation (Eq. 13, p. 85) for the rate of change in soil erosion (s) which is a function of the rates of change in prices ($\dot{p}/p$) and costs ($\dot{c}/c$), as well as the discount factor (r). The equation shows, other things being equal, a high discount rate induces an increased rate of soil erosion (similar to Hotelling's result for mining). In addition, a decline in product prices ($\dot{p}/p < 0$) combined with an increase in input costs ($\dot{c}/c > 0$) further increases the rate of change in soil erosion.

Looking back at the late 1970s and early 1980s, we see that real product prices have steadily declined while input prices have steadily risen. During the same period, real interest rates have increased to unprecedented levels.

Following McConnell's economic rent driven model, the farmer as a "rational economic man" would increase the rate of soil erosion.

The real world of agricultural production and finance is, of course, more complex. Castle and Hoch (1) have shown that only about half the farm real estate price at any time is explained by the capitalized value of rent associated with production. The other half is explained by capitalization of capital gaines. This second component of price is determined by all forces which cause real estate prices to change relative to the general price level. The real growth (or decline) in real estate value is dependent on land debt acquisition and on the difference between the inflation rate and price level component embedded in interest rates.

Melichar (3) in an aggregate analysis gives us further insight into the unfolding picture of farm asset values and finances. His data show income from agricultural assets climbed to $55 billion in 1973 (all values are from table 1 and in 1983 dollars) but dropped to $21 billion by 1983. Adding real capital gains on assets and determining the total return from equity, the value is $143 billion for 1973 and drops to $12 billion in 1983.

While this aggregate picture shows the overall trend in the agricultural economy, individual farmers are not all affected in the same way. Melichar shows the rate of income return to equity, by relative level and cost of debt (table 3, p. 9). For the farmer with a debt to assets ratio of 0 percent, the rate of income return to equity is 2 percent, a value that has persisted over the last 30 years. For the average ratio of debt to assets for the farm sector, 20 percent, and the average interest rate on outstanding debt, 11 percent, the rate of income to equity is -0.2 percent. When corresponding values are 30 and 15 percent, the rate of income to equity is -3.6 percent. So some farmers face substantially more financial difficulty than others. Melichar estimates that, of the group of large and medium-sized farms that includes most full-time family operations, one-third have debt-asset ratios that suggest financial stress. Melichar goes on to state: "Until the gap between the average rate of return to assets and farm loan interest rates is signficantly narrowed, these borrowers and their lenders will continue to face debt-service problems." This is very important to farmers' decisions to use practices that reduce soil erosion. As long as this group is in a financial bind, the farmers cannot act on their concern about long-term productivity. Their actions must reflect their concern for short-term financial survival.

Using information from Scott (7), we can see the situation for a specific type of farm, the "high quality crop-share grain farms in Illinois." For the years 1959 to 1982, he presents the annual net economic rent per acre, the land price per acre, and the interest rate charged on Federal Land Bank mortgages (table 1, p. 797). In only one year (1973) was the economic rent sufficient to cover the debt service on a 30-year amortized loan for the full value of the land. For 18 of the 24 years, the economic rent did not cover two-thirds of the debt service. Following 1973, the proportion of the debt service covered by economic rent dropped quickly to 50 percent (in 1975) and steadily declined to 20 percent in 1981 and 1982.

The direction of farm economy points to an increasing soil erosion problem. The financial position of a sizable number of farmers is such that they must be concerned with maintaining a cash flow sufficient to continue controlling their land. It is unlikely they will use cultural practices which increase

operating costs and/or reduce revenues in the short term and extend soil productivity in the long term. Given market signals, it appears the rational action to be taken is to use the soil to its maximum in the short term with little regard for long-term productivity. For these farmers to change their actions, they would have to see substantial changes in market signals (i.e., a positive rate of change in product prices, $\dot{p}/p > 0$; a negative rate of change in input costs, $\dot{c}/c < 0$; and a lower discount rate).

What is the likelihood of seeing the necessary changes in market signals? Both the market signals and the land valuation process described by Castle and Hoch are substantially influenced by fiscal, monetary, and tax policies. All aspects of the rational economy are influenced by these policies, and they are developed in a political setting involving forces extending far beyond the agricultural economy. If the factors influencing the national economy are brought under control, there will be a positive effect on the agricultural economy and this could lead ultimately to a change in the perspective of farmers toward short-term cultural practices and long-term productivity. Given the record over the last decade and the inertia of the economy, it is, however, unlikely that the overall economic picture will change dramatically in the next several years.

What is the likelihood of having Federal programs directed specifically to soil erosion problems? There is increased interest in soil erosion and natural resource issues (as Schaller (4) has pointed out). It is doubtful that additional funding will be available for soil conservation programs (or other natural resource problems) which provide long-term pay off, however. With back to back federal deficits of $195 billion and $175 billion and projections of continued deficits through the decade, it is improbable that programs with short-term gains will be given up while programs with long-term gains are increased. It is plausible that there will be programs designed to ease some of the financial difficulties facing farmers. If the financial picture for the farmers having difficulty improves for several years, it is possible that they would begin to improve their cultural practices with the aim of reducing soil erosion. The political reality is that specifically targeted natural resource issues will probably be postponed and that the 1985 farm bill will be developed in a political setting dominated by macroeconomic circumstances.

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