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Soil Conservation C

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SOIL CONSERVATION UNDER INTEGRATED FARM PROGRAMS

With several million additional cropland acres cultivated each year, soil erosion and related resource problems are on the increase. Consequently, after nearly fifty relatively uneventful years of federal conservation assistance, soil and water conservation once again has attained higher status on the farm policy agenda.

It is widely recognized that soil conservation assistance funded at present $800 million per year levels is not solving a rapidly expanding erosion problem. For example, only slight erosion reductions are expected even if new proposals for targeting funds to problem areas can be implemented (USDA, 1981). If prices again reach the higher levels that occurred during part of the past decade, U.S. erosion may increase by 70 percent (Cory and Timmons). The costliness or uncertain benefits of many conservation practices limit farmers' efforts to reduce erosion (Burt, 1981; Marsh and Parvin, 1979; White, 1980).

Yet, low cost solutions are attainable if farm programs were to focus more on erosion problems. The National Resources Inventory (NRI) found ample land resources readily available to meet substantially expanded food demands, while eliminating most or even virtually all of our serious erosion problems. Instead of massive new investment in soil conservation structures, what may be needed is a more rational use of the nation's soil resources. Under current market conditions most of the needed resource adjustments are attainable at little or no cost through selective integration of commodity price support and soil conservation programs.

In this paper several proposals for solving erosion problems are discussed in the light of insights gained from the NRI data and county level information on price support program participation. These include cross-compliance, bonus payments, a conservation reserve, implementation of new

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provisions to subsidize changes in cropping systems, and other alternatives to achieve greater integration of farm programs. The alternatives presented here represent a departure from traditional conservation programs requiring substantial increases in conservation expenditures before notable progress is achieved. Instead, they seek to attain the kinds of low cost resource adjustments or land use changes suggested by national economic modeling (Boggess and Heady, Wade and Heady).

Matching Treatment Measures to the Various Erosion Problems

Figure 1 illustrates the erosion problems existing on U.S. cropland acreage in 1977 when the first NRI inventory was conducted. Unlike the highly subjective surveys conducted in past years, the NRI obtained Universal Soil Loss Equation (USLE) parameters for a very ambitious sample of the Nation's resource problems. Because land with severe erosion requires different remedies than land with relatively moderate soil losses, it is useful to identify at least three classes of erosion problems by moving from left to right across Figure 1. These classes include (1) non-erosive cropland, of which there are 288 million acres, (2) moderate to severely erosive land, eroding between 5 and 25 tons/acre, and (3) critically erosive land, which includes the remaining 5 percent or so of the cropland base.

Non-erosive land erodes below the five ton per acre tolerance level identified by the dotted line in Figure 1. This tolerance level has been set as a goal by the Soil Conservation Service for most productive cropland in the U.S.; it is based on rough estimates that productive topsoil on cropland is replaced at about 5 tons/acre/year (Wishmeier and Smith). Attainment of this yield sustaining goal can be viewed as the top of the production function, beyond which further investments in protecting the soil yields no positive return. According to this logic, some erosion rate at or above 5 tons would be

economically optimal, but whether the optimal rate is 6 tons or 10, or even some higher level, has not been clearly established for any soil. What rate is optimal depends on soil depth and climate and is a subject for interdisciplinary study that will take some time. In the meantime, the existing state of knowledge suggests that the half of conservation cost-share assistance that is spent on non-erosive land could find a more productive employment by farm ers using land in the other two erosion classes.

The importance of focusing assistance where it is needed is emphasized both by the recent Resources Conservation Act (RCA) study and the Agriculture and Food Act of 1981. Lands considered to be moderate and severely erosive appear likely to benefit most from this new emphasis, because cost-shared conservation practices have been both effective and popular on these lands. Also, encouragement of lower cost, reduced tillage practices is advocated both by Congress and the Administration; such practices have proved the most popular among conservation techniques, as well as being effective on most of about 100 million acres of moderate and severely erosive lands (Ogg and Miller). Thus, there is some reason to anticipate real progress in dealing with this important class of problems.

The prospects for critical lands are less certain. With the exception of subsidies for the planting of "permanent" cover, our conservation programs do not offer assistance well suited to the needs of critical areas. In addition, less than ten percent of the cost-shares for permanent pasture is spent on critical areas. Most assistance for permanent pasture actually encourages forage production on non-erosive soils which then compete with the critical lands that need to be in conserving uses. Such misdirected assistance leads to a waste of valuable soil resources and illustrates a past failure to recognize that farm programs are capable of encouraging more rational use of soil resources. It should also be noted that on a tonnage

basis, critical lands account for most of the area between the curve in Figure 1 and the line representing the five ton tolerance level. Treatment of critical lands is, therefore, essential to state and national water quality programs (Ogg, Pionke and Heimlich).

Moreover, critical erosion occurs in some of our most productive agricultural areas (Figure 2). These include Southern Iowa and Northern Missouri, the Mississippi Delta, the Texas High Plains, parts of the Eastern Piedmont, and Southeastern Colorado and Southwestern Kansas. Because critical lands occur in important producing regions, adequate treatment will require a substantial reduction in row crop production, resulting in the need for incentives that could achieve a simultaneous attainment of immediate price support objectives and more far-reaching conservation objectives.

Alternatives for Achieving Greater Program Integration

In the past, areas of the country with critically erosive land have naturally tended to account for an important share of the adjustments which take place in response to periods of depressed farm prices (Figure 3). For example, between 1954 and 1964 a number of the most erosive counties lost 20 percent or more of their cultivated land. Under more closely integrated commodity and conservation programs this natural adjustment process might be enhanced greatly. Since farm programs have less influence today over how land is used, it has become more important to obtain the maximum benefit from these programs.

Cross-compliance regulation has thus far received far more attention during the RCA process than several other approaches to program integration. To some extent the early preoccupation with cross-compliance may have become a liability to the more general and positive concept of having one program support the other. Under cross-compliance provisions, USDA programs would take on a regulatory character: receiving price support or other farm program

benefits would be contingent on farmers carrying out certain conservation activities. Unfortunately, a bonus payment program was also described in the RCA reports as a cross-compliance alternative, even though there is no regulatory burden associated with the inclusion of conservation bonuses in price support programs.

This section will analyze and compare the proposals in turn. Since cross-compliance has gotten so much attention, the present analysis follows the precedent of dealing with it first. However, maps presented here showing farm program participation in the U.S. are relevant not only to cross-compliance policies but also to other alternatives for integrating assistance programs. For example, conservation bonuses could increase commodity program participation in erosive counties. A Conservation Reserve or subsidies to shift to less erosive cropping systems represent simpler approaches to achieve the same consistency and focus for farm programs. Although alternatives differ in funding and administrative requirements, they all would attain more consistency and efficiency between conservation and price support programs.

Cross-Compliance and ASCS Farm Program Participation In Erosive Counties

Conservation goals under current USDA programs require that erosion be limited to 5 tons per acre or less. Depending on the extent to which such a goal is sought under cross-compliance schemes, this objective could prove very expensive to meet on erosive cropland, even where it is technically feasible. Therefore, the potential effectiveness of a regulatory program hinges on whether the relatively small portion of our farmers who own highly erosive land are heavily dependent on the USDA programs.

Some of the major federal programs include price supports and diversions under commodity programs, FHA loans, and federal crop insurance. Among these, commodity programs are one likely candidate for cross-compliance because they

involve large numbers of farmers and they are administered by the Agricultural Stabilization and Conservation Service (ASCS), the agency that also administers conservation cost-sharing. Commodity program land diversions can, themselves, have a major role as a conservation tool. The impact of cross-compliance regulations is thus contingent on whether commodity programs are important to farmers in erosive regions. If programs are not vital to owners of erosive land, effective program integration clearly must include some redirection of funds to encourage their participation.

Relative incentives to participate in farm price support set-asides have not become vastly different among regions today as compared to programs in 1977 and 1978. Thus, ASCS state and county data on commodity program participation can be overlaid with the 1977 NRI data for erosive counties to determine the commonality of these two factors. If participation is high in erosive areas, the regulatory approach could be deemed to have potential as a means of integrating commodity and conservation programs.

Based on 1978 state level data and the set-aside and paid diversion programs in effect at that time, cross-compliance regulations would carry considerably more clout in some erosive regions than in others. In terms of corn acreage included in programs in that year, Texas seems the most likely candidate with 77 percent participation. At the other extreme, Tennessee had only 20 percent of its cropland participating. Tennessee accounts for some of the most severe erosion in the Delta. Iowa and Missouri fall about in the middle with 45 and 60 percent of corn acreage included in the program. A similar analysis for wheat indicates that serious erosion problems are less extensive, but where they occur, participation has been relatively high.

Figure 4 shows at the county level the proportion of cropland participating in ASCS commodity programs in 1977 for about 900 of the more erosive counties (those with some cropland eroding at over 25 tons per acre). Com-

paring Figure 4 with Figure 2 reinforces what was just described based on state level data. Potential success for cross-compliance regulations will vary widely between the main erosive regions. With some of the most severe erosion in the country, the Mississippi Delta stands to benefit more from program reform than any other region in the country. However, it also has the lowest participation in ASCS programs. Cross-compliance regulations are, therefore, likely to eliminate the few Delta farmers who would participate in a set-aside program. Since a crop set-aside or diversion in Tennessee may have had some positive impact in reducing erosion under past programs, imposition of cross-compliance regulations could actually backfire, resulting in less erosion control and less integration of USDA programs.

In terms of participation, the Texas High Plains shows much more potential than the Delta. In several of the more erosive counties in Texas corn farmers and virtually all cotton growers are in some degree dependent on commodity programs. Cross-compliance regulations would therefore appear more suited to Texas. However, there would be substantial obstacles even in the High Plains. Wind erosion on cotton land is the major problem in this region. To adequately treat this erosion involves either shifting land out of cotton production or pumping more water from the Ogallala Aquifer. Both would create problems for area farmers. It is particularly unlikely that cotton growers will abandon much of their cotton production as a price for participation in cotton programs.

Iowa and Missouri, therefore, remain as the only important erosion areas where strong cross-compliance regulation may not encounter major obstacles. Participation rates between 45 and 60 percent can be interpreted in different ways. Participation would finally depend, of course, on the specific cross-compliance requirements and farm program benefits in any given year.

Given the uncertain benefits and negative impacts from the regulatory approach, redirecting some portion of commodity program funds to erosive areas such as western Tennessee, may be the more practical way to achieve needed resource adjustments and more closely integrated farm programs.

Conservation Bonus Payments

The problem of insufficient participation that the more ambitious cross-compliance schemes face suggests an important strength of the conservation bonus proposal. The bonus concept was developed in an article by Benbrook (1980) and is discussed briefly in the RCA reports. Under this proposal bonuses would be offered to farmers who participate in price support programs if they also carry out conservation measures. If payments are limited to areas with serious erosion problems, bonus payments would encourage more commodity program participation in erosive areas. The proposal therefore has a double payoff: First, it makes full use of farm programs for getting conservation practices placed in moderately erosive areas where they are most effective. In addition, more operators on erosive land would be attracted into set-aside or diversion programs.

Payments to Shift Erosive Land into Less Intensive Uses

A large cost-share item in conservation programs covers permanent pasture planting. However, these payments, as with other ACP conservation assistance, are dispersed fairly evenly across the country (USDA, 1981). Figure 1 suggests that only a rather small part of the nation's land needs to be converted to grass or hay to meet soil conservation objectives, supporting the view that much of the subsidy for planting permanent vegetative cover goes to production-oriented uses and may not be needed for conservation.

A proposed solution is to target cost sharing for permanent pasture or for hay or sod-based rotations on critically erosive areas, where they are badly needed. It is argued elsewhere that a ten percent redirection of

conservation program funds to treat critical lands in this way is the least costly approach to achieve both adequate treatment of critical land and have a countercyclical impact on price variability. Critically erosive lands are sufficiently dispersed among counties that local communities need not be adversely affected. Since costs per ton of erosion reduction using this approach are less than a tenth of current approaches, assistance to change cropping systems may be the most feasible route to significant erosion and sediment reductions under present funding restraints (Ogg, Johnson, and Clayton). A provision in the Food and Agriculture Act of 1981 authorizes assistance to shift to less erosive cropping systems in a special areas conservation program.

A Conservation Reserve

A conservation reserve differs in that it is funded by commodity programs rather than ACP assistance. Under past conservation reserve programs, the Federal government has rented cropland from farmers, at surprisingly low rents, and placed the land in conserving uses. In 1960 a Conservation Reserve Program included about 28 million acres, well over twice the area needed to protect all critical sheet and rill erosion land in the U.S. The difficulty today with the 5 to 10 year contracts used in that reserve program is that prices are several times more variable than in 1960. In order to meet the needs of today's farmers and consumers, it would be necessary to offer flexibility within contracts to allow crop production within predominantly hay or sod rotations. Farmers would receive payments for placing land in the conservation reserve only in years when hay or other sod-based crops are grown.

At a cost of only $10 or so an acre, over 10 million acres were taken out of production during 1960 in relatively non- erosive states including Minnesota, North Dakota, and several Plains states. However, over five million acres in Texas and Oklahoma were obtained at rents as low as that, probably leading to considerable wind erosion control.

It is in humid areas, such as Southern Iowa and Northern Missouri and in Tennessee that critical lands can be most effectively protected by a conservation reserve. In Tennessee, about half a million acres were protected in 1960 at a cost of about $15 per acre. In Iowa it cost $18 per acre to protect between 0.6 and 0.7 million acres. The higher rent, however, buys a larger reduction in production, and therefore, more support for crop prices. Because real net farm income per acre of crop production has declined considerably since the early 1960's, payments not significantly higher than those offered 20 years ago would probably attract land into a conservation reserve today.

An Export Tax to Support Larger Conservation Programs

By way of contrast, some very costly solutions to erosion and sedimentation are being proposed. Since trade is now seen as an export of U.S. soil, it is argued that foreign buyers of our comodities could be taxed to support much expanded conservation programs (Sietz, 1981)

It is widely recognized that current approaches to providing conservation assistance can absorb rather large additional budget increases and still solve only a small part of the erosion problem (RCA, 1981). Some states have developed conservation plans that have been conservatively estimated to cost some $250 million (Brown, 1978, Marsh and Parvin, 1979); and others could spend many times that amount. (Brown describes a plan for North Carolina that would require terraces on one sixth of the cropland in the state, at an average cost of only $50 per acre treated. In other states per acre costs are estimated over ten times that figure!) Lower cost approaches first need to be examined before substantial new funds are committed to programs that would seem to offer little in the way of additional impact.

Conclusions

Large reductions in erosion are attainable within the budgets currently devoted to soil conservation. Some gains can be made if funds are redirected such that assistance is effectively targeted to erosive areas to encourage efficient conservation practices. However, our own analyses support the results of other studies during the 1970's showing the route to low-cost erosion and sediment control includes encouraging less intensive uses of erosive soils. Modest adjustments in either commodity programs or conservation programs could eliminate most of the erosion problem if even a small portion of program funds were effectively allocated as incentives to shift fragile lands out of cultivation.

Suggesting that federal programs should work in concert with one another is one of those ideas that is regarded as immensely reasonable, but often is not taken seriously in actual policy formulation. However, erosion problems will be sufficiently pressing to gain more prominence on the farm policy agenda. Available data and analytical capabilities now permit design of much more efficient and predictable national programs.

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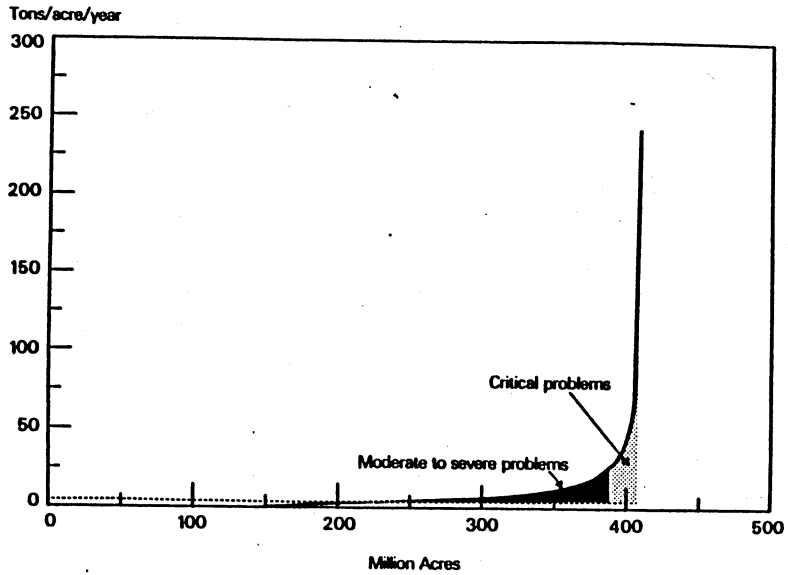

SOURCE: CNI tapes.

Figure 1. Three Classes of Erosion in the U.S., 1977.

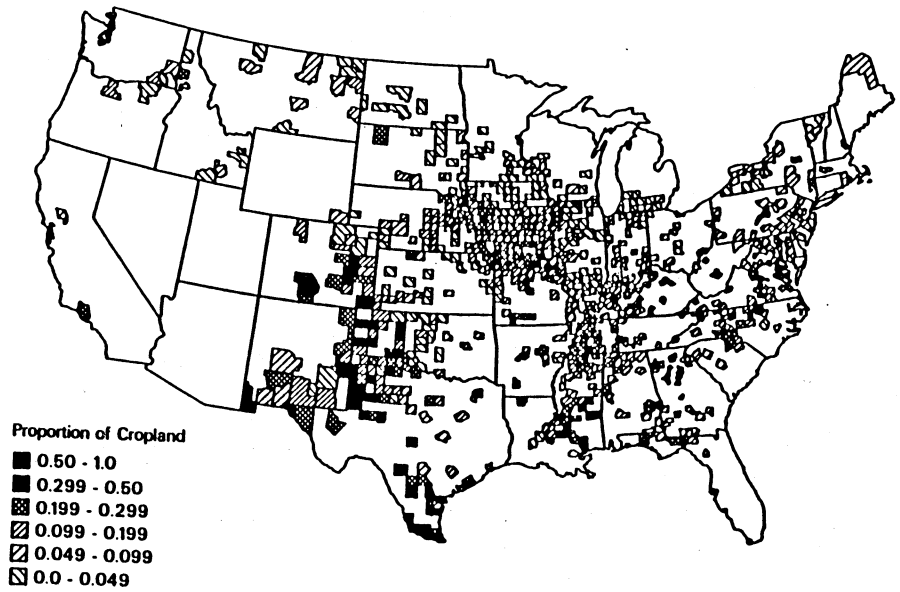

Figure 2. Proportion of Cropland Acreages Eroding Over 25 Tons/Acre, 1977.

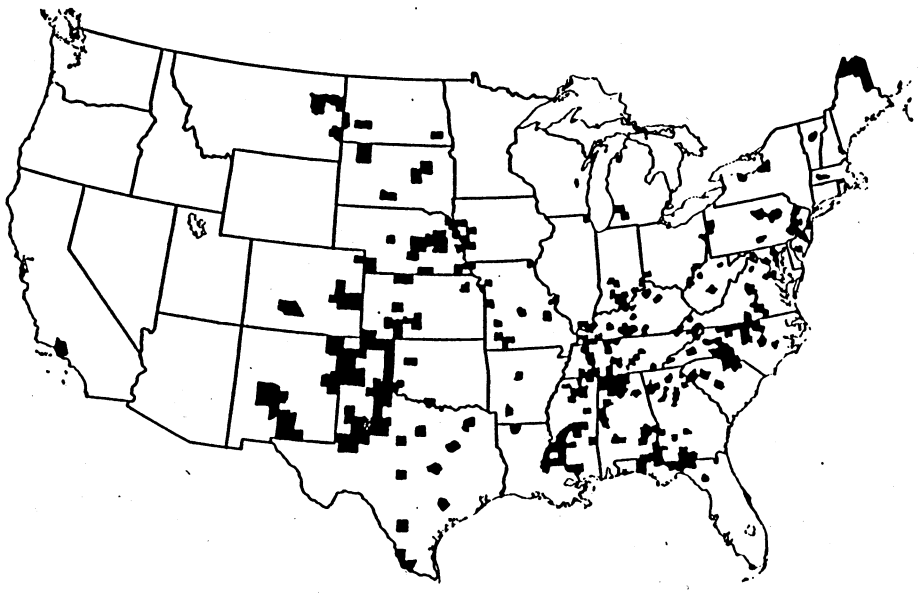

Figure 3. Counties with Some Critically Erosive Land that Lost 20 Percent or More of Cropland in Production Between 1954 and 1964.

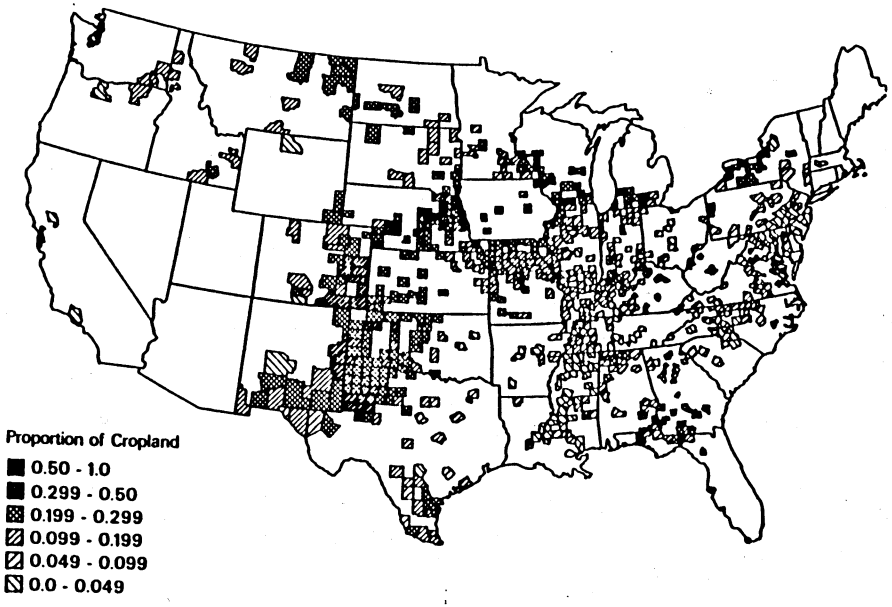

Figure 4. Proprotion of Cropland Participating in ASCS Programs, 1977.