

Soil conservation: “The search for solutions”

By Norman A. Berg and Robert J. Gray

IN the spring of 1982, the American Farmland Trust (AFT) embarked on a comprehensive analysis of the nation's soil conservation programs, in part because of congressional concern about soil erosion and the effectiveness of current programs to deal with the problem. Earlier, AFT had received a request from the U.S. House Agricultural Subcommittee on Conservation, Credit and Rural Development to provide Congress with a private-sector evaluation of cost-sharing, technical assistance, and other conservation programs at the federal, state, and local levels.

The project steering committee, which included a representative from the Soil Conservation Society of America, and the AFT staff settled on a three-pronged approach to the analysis. First, AFT undertook a series of interviews with nearly 700 farmers and ranchers in six states to find out what land owners and operators were doing and thinking about soil conservation. Second, AFT commissioned experts in various professions to prepare 25 technical papers on such important soil conservation-related issues as tax policy, cross-compliance, set-aside programs, education, funding, targeting, regulatory approaches, technology transfer, and state and local programs. Third, and perhaps most important, the project involved an in-depth review of the 1977 National Re-

sources Inventory (NRI) data.

All of these tasks were conducted concurrently over the past year and a half. Publication of the final project report in early 1984 will mark their completion.

The owner/operator interviews

The interviews of farmers and ranchers were conducted under contract with AFT by J. Dixon Esseks at the Center for Governmental Studies at Northern Illinois University. Esseks was assisted by Steven Kraft of Southern Illinois University. The interview process involved (a) the selection of specific agricultural areas; (b) the selection within each area of a study site, usually corresponding to a watershed; (c) enumerating, sampling, and interviewing farmers in each study site; and (d) analyzing the collected data. Study areas were selected to obtain as much diversity as possible in the land resources and in the nature of agriculture found among the areas. All areas were characterized by high levels of soil loss.

To accomplish this objective, the AFT interview team met with Soil Conservation Service (SCS) personnel and obtained NRI data on a number of counties in major land resource areas. Data on the nature of agriculture in each one of the counties were obtained from the 1974 and 1978 Censuses of Agriculture. From these initial data, a number of prospective counties were selected for further study.

The next step involved contact with Extension, SCS, and Agricultural Stabilization and Conservation Service (ASCS) per-

sonnel in each of the prospective states and counties. The intent was to identify watersheds or other geographical units that could become actual study sites. Criteria used to designate possible study sites included (1) number of farmers (a maximum of 300 operators); (2) average soil loss in the area of at least two times the soil loss tolerance (T-value); (3) existence of adequate, up-to-date ASCS farmer lists for use in enumerating the sample populations; (4) diversity in land resources; (5) diversity in type of agriculture and structure of agriculture, that is, tenure; (6) geographical diversity; and (7) a likelihood of identifying local people to conduct personal interviews with the sampled farmers.

Another selection principle was to avoid duplication of effort. Those areas where studies similar to the AFT effort had already taken place, or were in progress or planned, were removed from the list. Among the areas eliminated were the Palouse region in eastern Washington and western Idaho and a multicounty area in western Iowa, where Iowa State University was planning an extensive survey.

The six study sites selected were as follows:

Nixon Creek watershed, Haywood County, Tennessee. The Nixon Creek watershed in West Tennessee encompasses 28,000 acres. Much of the land is highly erodible. The SCS district conservationist estimates that annual soil losses per acre range from 12 to 54 tons and average about 20 tons—four times greater than the national average on cropland. According to the 1978 Census of Agriculture, 91 percent of the

Norman A. Berg is a senior advisor to the American Farmland Trust and serves as a consultant to AFT on its soil conservation study; Robert J. Gray is director of policy development for AFT, 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036.

value of agricultural products in the county was derived from crops. The county is part of an area targeted for combined SCS and ASCS efforts to reduce soil erosion. About 70 percent of the county's cropland in 1978 was in soybeans and corn.

Rattlesnake Creek watershed, Grant County, Wisconsin About 80 percent of this watershed's 35,000 acres is cropland. Soil losses in the watershed range from 3 to 50 tons per acre annually; average soil loss is about 25 tons. Rattlesnake Creek is located in a county with much dairy farming. Corn and hay are major crops.

Coal Creek watershed, Warren and Marion Counties, Iowa Soil losses at this Iowa site average 10 tons per acre annually, but they range as high as 35 tons. More than 60 percent of the watershed's 48,000 acres is in cultivated crops. The 1978 Census found that 28 percent of the value of farm marketings in Marion County came from crops and a majority from production of slaughter hogs and pigs. In 1978, 52 percent of Marion County's cropland was in corn; 28 percent was in soybeans.

Ora-Bradley area, Jackson County, Illinois Five small watersheds drain this 48,000-acre area. Half the land is in row crops. Soil losses range from 5 to 20 tons per acre annually; the average exceeds 10 tons. Jackson County farm marketings in 1978 consisted mainly of crops (72 percent); soybeans and corn dominated.

Perry County, Missouri The survey was conducted in an area distinguished by a particular group of soils, collectively called the Menfro soil association. The area comprises more than 20,000 acres, of which about 69 percent is cropland. Soil losses range from 5 to 60 tons per acre each year; the average is 17 tons. Countywide, more than two-thirds of the value of farm marketings in 1978 came from livestock. Hay, corn, and soybeans each accounted for about a fourth of the cropland in 1978.

Cope Conservation District, Washington County, Colorado The Cope Conservation District encompasses more than 500,000 acres, almost evenly divided into dryland crops and range. This is the only survey site where wind poses a major erosion hazard. Annual soil losses average more than 9 tons per acre (4 tons from wind, 5 tons from water). The range in soil loss is 3 to 45 tons per acre per year. In 1978, 44 percent of the farm marketings in Washington County were from crops, 56 percent from livestock. Dryland wheat is a major crop.

Interview methods and findings

A total of 678 farmers were interviewed in the six study sites, with a range of 73 to

143 per area. Farmers were selected randomly from county lists provided by ASCS. Interviews were conducted by local individuals, including vocational agriculture teachers, retired farmers, and farm housewives. All were trained by the AFT interview team.

The survey instrument, a mix of open-ended and fixed-choice questions, was pre-tested in the six study sites during August and September 1982. Interviews were conducted during the fall and early winter of 1982-1983. Each typically lasted for more than an hour per farmer. In addition to being asked the normal background information on the size and type of their operation, farmers and ranchers were asked to report what conservation practices, if any, they had applied to their operation and how effective they found these practices to be. They were also asked to evaluate governmental programs for promoting soil conservation that they had come into contact with and to comment on a number of conservation policy issues.

Because the six study sites all had average erosion rates at least twice the T-value, AFT wanted to find out how area farmers viewed erosion problems on the land they operated. Farmers were asked: "Does any of the land you own (or rent) have erosion problems, that is, where, without some conservation measure, yields would suffer and/or field operations would be interfered with, such as gullies?"

On average in the six locations, about 21 percent of the farmers owning land said none of it was affected by such erosion. Nearly half the rancher-owners in the Colorado survey area said they had no such problem, perhaps because erosion rates there were among the lowest in the survey areas. At the other extreme, only 10 percent of the farmer-owners in Haywood County, Tennessee, said none of their land was affected by such erosion.

The mean percentage of owned land reported as having erosion problems varied from 15 percent (Colorado) to 61 percent (Wisconsin). Across the six sites, an average of 25 percent of the persons interviewed who rented land said erosion was not a problem. Washington County farmers said 55 percent of their rented land did not have a problem, while eight percent of the renters in Haywood County made the same claim.

These measures of erosion's severity are subjective. But they indicate the extent to which the farmers believe there is a soil loss problem on their farms. While no actual measurements of erosion rates were made on the farmers' fields, the observations of SCS district conservationists indicate that

the actual extent of erosion problems is much greater than the farmers reported. There are probably several reasons for this. Sheet and rill erosion are the main forms in the counties surveyed, just as they are in the United States generally. Very often, only a relatively small amount of land within a field, farm, or county is severely affected by these forms of erosion.

SCS experts are able to estimate sheet and rill erosion rates and gauge their severity, but most farmers will see little physical evidence of such erosion in their fields—a few rills after spring rains perhaps. This is hardly enough erosion to interfere with field operations, though estimated soil loss may reach 45 tons per acre yearly, as it reportedly does in some fields in most of the study areas. It is somewhat surprising that highly visible wind erosion did not elicit a greater awareness among the ranchers interviewed in Colorado.

Conservation practices used

Terraces were used by many farmers, but only at the Tennessee site did they account for an appreciable percentage of the total acres treated with conservation measures (25 percent).

While many farmers in the survey areas used some form of reduced tillage to control erosion, only in the Marion-Warren area was as much as 40 percent of the land affected by some form of conservation tillage. And in Haywood County, more land was served by terraces than by reduced tillage systems, despite the large cost advantage that conservation tillage should have in that area. The relatively large number of farmers using tillage practices on a small amount of their land suggests a period of experimentation rather than widespread adoption of this practice.

Rented land apparently received nearly as much conservation treatment as owned land, and in the case of the Perry County survey site, rented land may have received more treatment. The data have not been fully analyzed yet, but if this relation holds, it would contradict a widely held assumption that owned land tends to be much better conserved than rented land. Several other studies have shown differences in conservation effort among tenure types. However, the AFT survey indicated that if a farmer practices conservation tillage on land he or she owns he or she is likely to practice it on rented land as well.

How much effort do farmers and ranchers devote to soil conservation? That is a difficult question to answer, but AFT attempted to measure it in the survey by asking about the number of conservation

practices used and the amount of land served by more than one practice

Excepting the Washington county survey site, the average farmer interviewed had a repertoire of three to four practices. On the average, each acre in the survey areas was treated with about one and one-half practices.

By far the highest ranking practice used by the farmers interviewed was the grassed waterway. Over 90 percent of the farmers had grassed waterways in the Marion-Warren and Grant County sites. Grass waterways also ranked first in the Jackson and Perry survey areas.

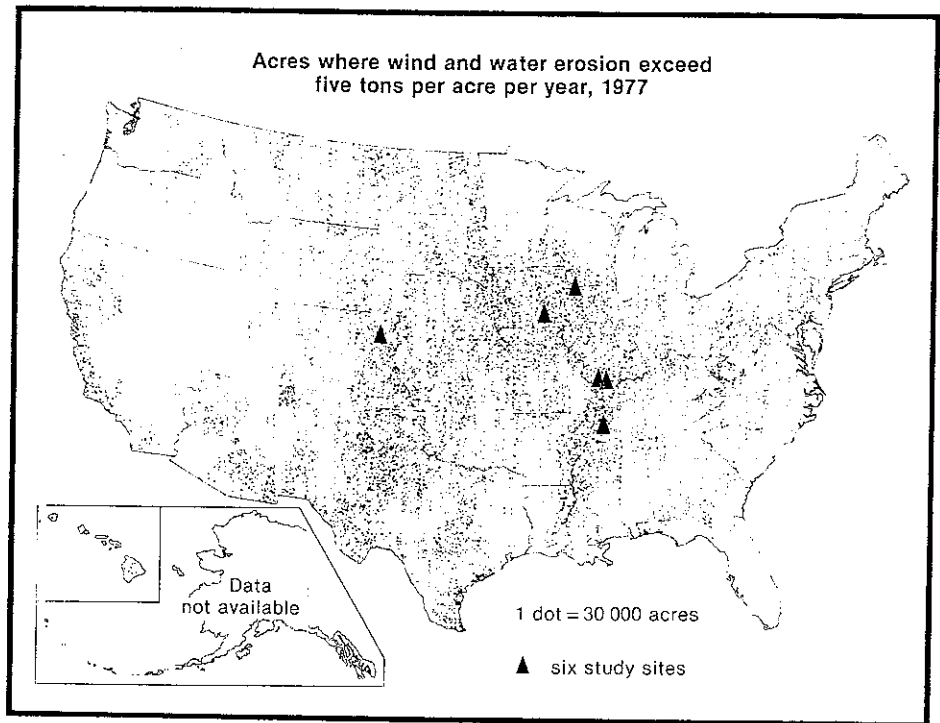
It is important to note that grassed waterways in themselves do not protect large portions of a given field from erosion. They are designed to work in combination with other soil and water conservation practices, such as terraces, contour farming, and diversions, which direct water into grass waterways. The waterways conduct this concentrated flow of water off the field with minimal damage to the soil. Grassed waterways are always planted in those portions of sloping fields where water concentrates naturally and where gullies are most likely to form.

Farmers taking advantage of USDA soil conservation assistance programs tended to have higher gross sales and more years of farming experience than nonparticipants. A sizeable majority of those interviewed (69 percent) said that the major reason for using a particular practice was the expectation that it would lower operating costs.

This contrasted sharply with the expectation of receiving cost-sharing funds and technical assistance from ASCS and SCS. Of the relatively few farmers who identified governmental assistance as the primary reason for doing conservation work, only about 27 percent, on an average, said that such aid had been indispensable. The survey indicated, therefore, that a great deal of important conservation work (important at least in the eyes of the farmers interviewed), particularly reduced tillage practices, may have been undertaken without any governmental cost-sharing or technical assistance. On the other hand, many farmers may have forgotten how significant governmental assistance really had been to their decisions to adopt conservation practices, or they may have been reluctant to credit government with a contribution of this nature.

Reaction to policy options

On the policy side, the survey found that the farmers tended to support targeting, required maintenance of government cost-



shared conservation practices, statutes to protect farmers against damages from soil erosion on adjacent land, income tax credits for investments in soil conservation, and government payments to take highly erosive land out of intensive cultivation. Such support tended to be broadly based, at least in the sense of not being significantly different by levels of operator's farm sales, experience in farming, or rental status.

One of the other key policy questions asked involved the issue of cross-compliance, a term that has been used in reference to literally dozens of conservation policy ideas. It was learned in the survey that much of the negative response among farmers and operators to this term can be traced to misunderstanding of what is meant. When farmers were asked directly how they felt about one of the most extreme forms of cross-compliance—the question: "Farmers who grow crops on erosive land without conservation protection should not be eligible for participation in government commodity price support programs or other assistance programs"—a majority (52 percent) in the survey supported this approach.

Broadening the information base

While the AFT soil conservation project was ongoing, a number of other important activities were either underway or completed. The U.S. Department of Agriculture (USDA), of course, completed the ini-

tial phase of Public Law 95-192, the Soil and Water Resources Conservation Act (RCA). Overall, RCA revealed USDA's limitations to do what Congress had in mind in passing the act. The conservation agencies within USDA struggled with some difficult issues and with some hard policy choices.

Overall, there has been progress. Today, at every level, from the general public to the conservation profession, people have a more sophisticated grasp of soil conservation problems than they did in 1977. This improved understanding has opened the door to innovative policy ideas. The farm community and the general public are more receptive. RCA had much to do with that.

Unquestionably, the most important contribution made by the law was the appraisal process it mandated: the collection and analysis of a vast amount of data on resource conservation conditions and trends. This information represents nothing less than a revolution in people's understanding of the erosion problem. Consider the fact that no reliable estimates of soil erosion rates existed until the 1977 NRI. By mid-1984, results of the 1982 NRI should be available. This information will further refine people's knowledge of where erosion is occurring and at what rate.

Also, in early 1981, ASCS released the first evaluation of the Agricultural Conservation Program (ACP) in the program's 50-year history. The evaluation expressed a great deal about the entire voluntary

framework of conservation and its effectiveness at every level of government. It indicated which practices were most cost-effective, and it opened important opportunities to improve both cost-sharing and technical assistance. That evaluation is ongoing and forms the basis for a comprehensive evaluation of major USDA conservation programs, including the technical assistance activities of SCS.

This basic information presents exciting opportunities as well as fundamental challenges to the conservation interest groups and agencies that have had primary responsibility for conservation programs since 1933. Without it, the types of policy options available would be restricted.

In addition, little research had been done until recently on the relationship between soil loss and crop productivity. In the next few months, the results of several important research programs investigating that relationship will begin to appear. This research will go a long way toward helping to identify where soil erosion is hurting farmers and society the most.

The basis for this abrupt improvement in knowledge is, of course, the use of scientific methods to estimate soil erosion rates. The 1977 NRI was the first such land survey to use these methods, providing the first valid estimates of rates and total tonnages of the major forms of soil erosion at the national and state levels. The 1982 NRI will provide such estimates with multi-county-level reliability.

These methods are not perfect to be sure. For example, the universal soil loss equation, which was used to predict sheet and rill erosion, underestimated erosion rates in areas where irrigation water or snowmelt were the major causes of these forms of erosion. Furthermore, SCS was unsuccessful in its attempt in 1977 to use the wind erosion equation to estimate wind erosion, except in the 10 Great Plains States. The 1982 NRI will provide this information for other states, however.

Imperfect though they are, the estimates represent an unprecedented improvement in information about soil erosion. They provide reliable data on the major types of erosion for most climatic conditions and geographic regions in the United States.

Without question, the most important finding in the 1977 NRI was that a relatively small proportion of the nation's agricultural land accounts for a very large proportion of the total erosion. The degree of this concentration could not be estimated prior to the 1977 inventory and in fact was not fully evident for several years after the NRI results were released. Conservationists

had always known, of course, that some areas were affected more than others by erosion. But it is fair to say that even experienced soils experts were surprised by the degree of concentration.

Sheet and rill erosion account for about 60 percent of the 5.3 billion tons of soil loss reported by SCS in 1977. If all land uses are considered—cropland, pastureland, forest, and rangeland—60 percent of the area suffered erosion rates of less than 2 tons per acre per year.

In contrast, sheet and rill erosion rates on some land were extremely high. Nearly 20 percent of the total sheet and rill erosion in 1977—772 million tons of soil—was found to occur on just six-tenths of one percent of the land area. On this land, erosion rates averaged 60 tons per acre per year. That is approaching one inch of soil loss every two years.

The most erodible five percent of the land base—that which was eroding at rates in excess of 11 tons per acre annually in 1977—accounted for 52 percent of the total sheet and rill erosion, according to SCS. With adequate conservation treatment, soil loss on this five percent of the land in the United States could be reduced 43 percent.

The central concern in AFT's project was erosion on cropland. Again, the 1977 NRI showed soil erosion to be highly concentrated. Just 25 million acres, six percent of all cropland, accounted for 43 percent of the sheet and rill erosion.

AFT's analysis also showed that erosion was concentrated within a state. In Tennessee, for example, about five percent of the land accounted for more than half of all sheet and rill erosion, according to SCS data. Erosion rates on that land averaged 48 tons per acre each year, about 11 times the national average. That is a loss of nearly an inch of soil every three years. This overall pattern held true even where wind erosion was the main problem.

In fact, soil erosion was concentrated within every land use category, within every county, within certain fields on every farm, and within certain portions of those fields. To a surprising degree, erosion was even concentrated within each of the land capability classes. Most of the land with a great potential for erosion had essentially no conservation treatment of any kind, no traditional measures, such as terraces and contouring, not even profit-enhancing measures, such as conservation tillage. That was the finding in the 1977 NRI, and it was a consistent finding in the 1981 ACP evaluation.

Few cropland acres were treated with traditional conservation practices—ter-

aces and contour farming—in 1977. Only nine percent of the nation's cropland was terraced in 1977, and on most of that land, erosion was not a severe problem even before the practice was installed. About 71 percent of the acreage where terraces were the primary conservation practice was in the Great Plains. The terraces there were primarily for water conservation purposes. In contrast, Iowa, the leading state for sheet and rill erosion, ranked seventh in terraced acreage.

Less than five percent of the nation's cropland was protected by contour farming in 1977. About 63 percent of the land treated with minimum tillage as the primary conservation measure in the Corn Belt in 1977 had a modest potential for sheet and rill erosion before the practice was adopted.

As of 1977 then, conservation measures of all types tended to be concentrated on land with fairly modest soil erosion hazards, while the most erosive land remained largely untreated. This highly erodible land accounted for much of the country's erosion.

The 1982 NRI, of course, will give some indication of whether or not these disturbing trends are continuing.

Toward new land classes

During the course of AFT's analysis, it became clear that if government soil conservation efforts are to be effective, efficient, and equitable they must be based on the recognition of inherent differences in land quality. Therefore, as a first step in accomplishing the nation's conservation objectives, AFT suggests classifying land according to conservation needs and opportunities. A three-tiered land classification system would provide guidance to conservation districts, ASCS committees, and USDA personnel as they review applications for ACP cost-sharing, technical assistance, crop price support programs, and other USDA program activities.

Briefly, the three-tiered classification system would consist of that cropland not seriously threatened by erosion (Group I). Group II land in the classification system would consist of that cropland experiencing moderate though often damaging levels of erosion. Group III would contain that cropland experiencing severe soil losses.

Historically, technical and financial assistance from government for soil conservation have not given enough priority to actual soil erosion reduction. This is true of field-level assistance as well as the distribution of federal conservation program resources among states. In addition, USDA

crop price support programs have been designed and operated with virtually no consideration as to their effects on land use. Moreover, cropland set-asides, diversions, and even long-term retirement programs, such as the Soil Bank of the 1950s, have never differentiated well between the qualities and capabilities of land eligible

for enrollment. As a result, valuable opportunities to achieve long-term conservation and production adjustment simultaneously have not been realized.

A three-tiered land classification system might help coordinate and direct all USDA programs in a manner that would match government programs to conservation

needs in the most efficient manner.

The AFT report contains more than 20 recommendations. Each recommendation is accompanied by a background statement, the rationale for that statement, and details on implementing many of the recommendations, including the proposed land classification system. □

AFT recommendations

Following are the recommendations from the draft report of AFT's study, "The Search for Solutions."

I. Toward a national policy for agricultural resource conservation.

1. A national policy for agricultural resource conservation should be established by the United States in the 1985 farm bill and adhered to by all agencies of the government.

2. The secretary of agriculture should establish within USDA a permanent coordinating body, with a full-time staff, and chaired by the deputy secretary of agriculture, to assess and analyze all aspects of all USDA programs as they affect agricultural resource conservation.

3. The House and Senate Agriculture Committees should conduct oversight investigations, including public hearings, into (1) the performance of USDA conservation programs after the first cycle of the RCA [Soil and Water Resources Conservation Act] and (2) the conservation effects of USDA's commodity and credit programs.

II. Identifying soil conservation needs and opportunities on cropland.

4. Cropland in the U.S. should be designated into one of three groups by local conservation districts on the basis of practical, consistent, and scientifically sound criteria reflecting the land's vulnerability to erosion.

5. Primary technical responsibility for developing the classification scheme and for local designation of cultivated land into Group 1, 2, or 3 should be given to the Soil Conservation Service, working through and in cooperation with local soil and water conservation districts.

III. Coordinating government conservation and commodity programs.

6. Land in Group 1 should be set-aside, diverted, or otherwise retired from production of cultivated crops as a requirement for participation in USDA crop price support programs only when inadequate acreage is obtained for production control purposes from Land Groups 2 and 3.

7. USDA's traditional technical and financial assistance efforts for erosion control, as well as Extension Service activities, should place high priority on cost-effective tillage practices, primarily on moderately erodible Land Group 2.

8. USDA should continue with targeting of technical and financial assistance for soil erosion control, but with a limit to the areas designated.

9. The pilot Variable Cost-Share program of ACP [Agricultural Conservation Program] should gradually replace existing procedures for the overall ACP over a five-year period, beginning in fiscal year 1985.

10. In formulating and implementing USDA commodity price support programs, high priority should be assigned to long-term conversion of Group 3 land to conserving uses such as pasture, hay, range, forest, or wildlife habitat.

11. As soon as possible, USDA should use a pilot approach to test procedures and criteria for, and to evaluate the effectiveness of, a conservation reserve program.

12. For highly erodible lands not covered by a conservation reserve contract, the ACP, experimental Rural Clean Water Program, or Great Plains Conservation Program, should be used to encourage the establishment and maintenance of permanent vegetative cover.

13. Wherever state or local conservation programs have been adopted to encourage conversion of Group 3 lands to stable uses, USDA should make a special effort to provide assistance via the conservation reserve, long-term ACP land retirement contracts, or GPCP.

14. Through legislative and administrative initiatives, Group 3 lands not devoted to the production of crops as of a specified time should be designated as ineligible for future participation in USDA commodity programs (including the conservation reserve), the federal crop insurance program, and other publically funded programs.

15. USDA should encourage member organizations of the Farm Credit System to adopt procedures and policies designed to encourage enrollment of Land Group 3 in the conservation reserve, or

otherwise encourage conserving use of Group 3 lands.

16. In repatriating land received through loan foreclosures or bankruptcies, the Farmers Home Administration should encourage sustainable use of the land, including enrollment of any Group 3 land in the conservation reserve.

IV. Improved resource information and program evaluation.

17. In analyzing and presenting the results of the 1982 National Resources Inventory, USDA should give first priority to information on soil erosion and conservation on cropland.

18. USDA should make a special effort to distribute data tapes and documentation for the 1977 and 1982 NRIs to a wide range of public and private groups and individuals with an interest in conservation.

19. USDA should to the extent feasible collect data on farm and conservation programs, natural resources, and other topics in a way that allows these data to be integrated and coherently analyzed.

20. USDA should initiate a joint SCS-ARS [Agricultural Research Service] project to update and improve the Land Capability Class System.

21. USDA should continue to implement the Conservation Reporting and Evaluation System (CRES), and should, to the extent feasible, use the information to direct conservation program activities and expenditures in the most efficient manner.

22. The secretary of agriculture should have an effective interagency mechanism to coordinate the research efforts on the impacts of soil erosion on productivity and off-site damages.

V. Improving state and local conservation efforts.

23. In cooperation with county governments and conservation districts, each state should develop a comprehensive plan for reducing soil erosion damage statewide.

24. County governments and conservation districts should be jointly responsible for implementing state soil conservation programs. □