BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

A Framework And Checklist For Evaluating Soil And Water Conservation Programs

For a program to compete successfully for appropriated funds, the Congress must be persuaded that program expenditures represent an essential and effective use of Federal dollars.

The information required for the Congress to make this determinination can be provided through answers to a series of questions. Taken together, these can serve as a checklist against which agencies can judge whether they have covered all pertinent issues.

To demonstrate this method, GAO constructed a framework for evaluating the Department of Agriculture's soil and water conservation programs. With changes in terminology, this framework can be adapted to evaluations of other Federal programs.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report presents guidelines and a checklist of questions for use in the oversight of the Department of Agriculture's soil and water conservation programs. These questions and guidelines provide a systematic framework which can be used by the Department (1) in conducting evaluations and (2) for reporting information which we believe is relevant in determining that soil and water conservation programs are meeting needs in an effective and efficient manner.

Although this framework was developed with particular programs in mind, we believe that the approach can be applied to other programs in the Department of Agriculture and in other departments and agencies.

This report was prepared as part of our continuing oversight assistance in response to a request from Senator Herman E. Talmadge, Chairman, and Senator Bob Dole, Ranking Robert J Minority Member, of the Committee on Agriculture, Nutrition, and Forestry.

Officials of the Department of Agriculture have reviewed our draft report. Their comments are included in this report. Copies of this report are being sent to the Secretary of Agriculture and the Director of the Office of Management and Budget.

Comptroller General
of the United States

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COMPTROLLER GENERAL
REPORT TO THE CONGRESS

A FRAMEWORK AND CHECKLIST FOR EVALUATING SOIL AND WATER CONSERVATION PROGRAMS

D I G E S T

Federal programs are coming under increasing scrutiny. In order for a program to compete successfully in the budget process, it has become increasingly necessary to demonstrate that its expenditures represent an essential and effective use of Federal funds.

The Congress is considering various proposals for oversight reform to improve the capability for determining (1) how well laws and programs are being implemented, (2) whether a program is still needed, and (3) at what level a program should be funded. Some of these proposals have included language which would specify the kind of information to be reported by executive agencies.

While GAO agrees with the general intent of legislation designed to bring about more careful scrutiny of each program, we believe (1) that executive agencies may encounter problems in identifying the specific required information and (2) that the Congress may have some difficulties in focusing on relevant information in the masses of information which could be submitted. For these reasons, GAO has undertaken to identify the relevant information for oversight of one set of programs, the 30 soil and water conservation programs administered by the Department of Agriculture. The method we developed can be modified for use in other Federal programs.

These programs are designed to deal with problems such as soil erosion, food and fiber productivity, water pollution, irrigation and drainage concerns, flooding, wind erosion, and the lack of wildlife habitat. Eighteen programs accomplish these purposes directly through technical assistance, education, cost-sharing, loan assistance, and direct resource management. Twelve programs provide support to the direct programs through planning efforts, resource surveys, research, and other analytical efforts.

GUIDELINES AND CHECKLIST OF QUESTIONS

To specify the information required for congressional oversight we developed a series of questions. These questions can serve as a checklist for judging which information submitted by Agriculture is pertinent to congressional consideration of each program. From Agriculture's perspective, the questions can be used as a framework for the evaluation of its programs (ch. 2).

The first component of the evaluation framework lays out questions and guidelines for identifying program purposes and objectives based on the problems which the programs are intended to solve (ch. 3).

Because many programs have objectives in common, we believe that oversight must examine together the benefits, costs, effectiveness, and necessity of programs which have the same purposes, in addition to examining each program on its own merits. The information required for this type of oversight consists of answers to (1) broad evaluation questions (which can be adapted to any set of programs) (ch. 4), (2) questions about specific programs (app. II), and (3) questions about specific soil and water conservation problems (app. III).

Activities under the conservation programs are intended to bring about the installation or implementation of conservation measures and practices. These practices must be examined to determine the potential for their improved efficiency and effectiveness. Information on practice effectiveness must be included in evaluating any of the programs (ch. 5).

USE OF QUESTIONS AND GUIDELINES

GAO's questions and guidelines are intended to be based upon decisions that must be made regarding soil and water conservation programs by the Congress and its committees, the Office of Management and Budget, Agriculture and its constituent agencies, the program

managers, State and local offices, operating personnel, and the farmer or group who must decide whether to install or adopt a conservation practice. We envision that the questions, the guidelines, and any answers would first be used for program management. As a secondary matter, the answers would be used in the budget process. (See ch. 2.)

The set of questions and guidelines is intended to establish a long-term framework for evaluating the performance of soil and water conservation programs.

The procedural and information requirements specified in the evaluation framework are intended to serve as guidance on how the programs should be operated and managed as the basis for providing information to be used in congressional oversight. The framework is not intended to lay out the requirements for a massive data-gathering system, but rather to suggest what should be considered in developing evaluation plans to be carried out by USDA and by individual agencies with respect to soil and water conservation programs.

The questions are so complex that the framework will have to be adopted gradually, after a systematic analysis of each question's value and validity. This analysis should determine, among other things, (1) what data is required, (2) how it will be gathered and used, and (3) how much the data-gathering system will cost. (See ch. 2.)

RECOMMENDATIONS TO AGRICULTURE

GAO recommends that Agriculture develop a plan leading to an evaluation system covering all soil and water conservation programs. In developing this plan, Agriculture should determine the relevance of the questions included in the evaluation framework. In particular, the evaluation plan should identify the importance of these questions for program management and reporting program progress. GAO also recommends that Agriculture include in its annual report required

by the Soil and Water Resources Conservation Act of 1977 statements on its progress and difficulties in trying to incorporate evaluation concepts into its management and reporting processes.

MATTERS FOR CONSIDERATION BY THE CONGRESS

The Comptroller General has recommended that, where evaluations are needed, the Congress should work with agency officials to seek a common understanding on program objectives and acceptable performance measures and data for each program. In view of the complexity of the evaluation framework described in this report, implementation of the recommended evaluation plan will be incremental and can be expected to undergo many evolutionary changes. Therefore, the Congress should review the evaluation plan and any reporting specifications so that information reported is as useful as possible in making decisions and setting budgets for these programs. The evaluation framework described in this report can assist in making such a review.

AGENCY COMMENTS

Agriculture's comments on the draft of this report are reproduced in appendix V. They agreed with our recommendations, stating that they "have already begun the process of internalizing" the concepts and concerns "that must be considered in developing an evaluation system" and "that must become an integral part of program development, management, and evaluation... to carry out the mandates of Congress in an effective and efficient manner." They believe their "evaluation activities will ultimately evolve into a standardized process which will meet the objectives and needs of the Congress."

Agriculture noted several laws under which the Congress has requested evaluations. We believe that our evaluation framework is consistent with these requirements and that it can help Agriculture meet them. This framework is not intended to duplicate what is

done under these authorities, but rather to provide guidance in satisfying their requirements.

Agriculture also described several current efforts to establish evaluation processes and to develop useful information for evaluations. Although we have not examined these efforts in detail, we support them in principle. Information developed in such systems should be useful in program management, resource allocations, and budget justifications.

Tear Sheet

Contents

ABBREVIATIONS

ACP	Agricultural Conservation Program
ASCS	Agricultural Stabilization and Conservation Service
COP	Conservation Operations Program
ESCS	Economics Statistics Cooperative Service
FmHA	Farmers Home Administration
GAO	General Accounting Office
NHCP	National Handbook of Conservation Practices
OMB	Office of Management and Budget
RCA	Soil and Water Resources Conservation Act of 1977 (Public Law 95-192)
SCS	Soil Conservation Service
SEA-AR	Science and Education Administration-Agricultural Research

SEA-CR	Science and Education Administration-Cooperative Research
SEA-E	Science and Education Administration-Extension
USDA	Department of Agriculture
ZBB	Zero-based budgeting

CHAPTER 1

INTRODUCTION

This report provides a framework to be used to evaluate the soil and water conservation programs administered by the Department of Agriculture (USDA). Our framework is presented as a series of questions that we believe should be considered in evaluating various aspects of these programs. The report also contains our rationale for many of the questions and our guidelines for interpreting and answering the questions.

It is intended that the evaluation framework (i.e., the set of questions) be based upon the decisions that must be made regarding soil and water conservation programs by the Congress, congressional committees, the Office of Management and Budget (OMB), USDA and its constituent agencies, program managers, State and local offices, and operating personnel, and the farmer or group who installs or implements a conservation practice. In other words, we believe that the questions need to be addressed if proper decisions are to be made about the programs. Current decisions may often be based on inadequate information, whether as a result of legislative restrictions, poor management, political considerations, or program overlaps. We have therefore designed questions intended to improve USDA's information base and its use in program management and the budgetsetting processes.

NECESSITY FOR AN EVALUATION FRAMEWORK

Although our effort began with a request from the Senate Committee on Agriculture, Nutrition, and Forestry to help them prepare for oversight hearings on soil and water conservation programs, the need for an evaluation framework could have arisen as well from the general congressional movement toward oversight reform. In assisting the Committee, we found that a systematic approach, such as that used in program evaluation, was required to deal with the large number of soil and water conservation programs. Program evaluation usually deals with single programs that may have many objectives. In our effort, however, we had to consider a more complex situation. Soil and water conservation encompasses many programs with multiple, although similar, objectives. Each program is administered by a multilevel organization, and distinct management decisions are made at the national, State, and local (or regional) levels. Program complexity is further increased by the fact that each program represents a different legislative method for bringing about the installation of a conservation practice by farmers or other groups, including local, regional, or State governments.

To deal with this complexity, we had to develop an organizing principle within which we could apply the traditional techniques of program evaluation. We found that one way of doing this was to treat the several programs as activities of a single large program with purposes and objectives drawn from the individual programs. With this interpretation, a comprehensive evaluation would have to determine the relative effectiveness of the several programs and the individual conservation practices. In all other respects, the concepts of program evaluation continue to apply. The conceptual basis of our framework and the components which gave rise to it are described in chapter 2, along with some suggestions and considerations for USDA's use in adopting and implementing the framework.

PURPOSES AND OBJECTIVES

An evaluation first delineates the purposes (what is to be accomplished) and the objectives (how much is to be accomplished) of the several programs, both individually and as a group. The purposes, which for the most part can be identified from the legislation establishing the programs, consist of two types: (1) those which describe the conservation problems (such as erosion, water quality, and flooding) that are to be solved and (2) those which describe the mechanisms (such as cost-sharing, technical assistance, and loan assistance) by which Federal intervention is to be provided. In delineating the purposes of the programs, it is also necessary to identify the measures of effectiveness by which progress can be assessed.

Establishing objectives (how much is to be accomplished) is a long and involved process designed to articulate what is realistically expected from each program or group of programs. To do this, it is first necessary to understand the extent of the problems stated in the purposes; this requires decisionmakers involved in soil and water programs to seek agreement on indicators and estimating procedures used for measuring the extent of problems. The establishment of objectives proceeds with this information and is the process by which decisionmakers determine how much of each problem they intend to solve, either for the long term or for the short term. Long-term objectives may be hopes or wishes, but short-term objectives should be based on the realistic capability of a program or set of programs to achieve the objectives at a given level of funding. The process of setting objectives should be a part of the budgetsetting process.

Questions and guidelines for delineating purposes and setting objectives are described in chapter 3.

CONSERVATION PROGRAM EVALUATION

The basic information required to evaluate the soil and water programs should consist of impact (or benefit) and cost data. Impact information should attempt to describe the changes in the extent of the problems as a result of a program's intervention. To assess program success, this information should be expressed in monetary terms where feasible, but in many cases nonmonetary indicators can be used. If possible, the impact assessment should also include other effects of the programs; e.g., unintended effects on the economy or the environment. Cost information should include all costs that can be assigned to the programs and any costs that can only be allocated proportionately. The reason for developing impact and cost information is to assess the net social value 1/ of each program.

Impact and cost information should be broken down or allocated to program activities if possible. Such a breakdown permits a comparison of benefits and costs among programs or program activities or among geographic areas. Information on the relative importance of solving different conservation problems assigned by decisionmakers and the public should also be presented.

With this information USDA should try to make an overall assessment of the extent to which objectives are met and the extent to which the level of achievement can be attributed to the programs. As far as possible, USDA should indicate:

--what the programs are accomplishing,

--the extent to which the programs work in the way intended,

--whether and to what extent the programs are accomplishing the most good or could accomplish more,

--in what ways the programs are not working as expected, and

1/In this report, the phrase "net social value" is intended to include monetary benefits and costs, any nonmonetary benefits and costs (which may or may not be quantified), and all other social and political values associated with a program or any of its activities that a decisionmaker may take into account when reaching a decision. In any specific evaluation, the elements used for assessing net social value need to be explicitly set forth.

--what is being done to remove factors that decrease program effectiveness.

Questions, guidelines, and factors to be considered in evaluating the programs are discussed in chapter 4.

CONSERVATION PRACTICE EVALUATION

Each conservation program represents a distinct method for installing or implementing conservation practices, which may range from the application of fertilizer to the construction of multipurpose dams. The evaluation of the programs, therefore, encompasses an evaluation of the efficiency and effectiveness of these conservation practices.

Procedures for evaluating practices are required to determine if they are being installed where needed and to determine their aggregate contribution to achieving the purposes and objectives of each program. Although it is impractical to assess each practice that is installed, estimates can be made to determine the actual impact, cost, effectiveness, and need for each practice. In the past, several practices have been criticized for being oriented toward production goals and hence unsuitable for solving conservation or environmental problems. Information developed in evaluating practices will provide decisionmakers with a better basis for assessing this issue.

Questions, guidelines, and factors that should be considered in evaluating practices are presented in chapter 5.

SCOPE OF REVIEW

Senators Talmadge and Dole of the Committee on Agriculture, Nutrition, and Forestry requested 1/ in June 1976 that GAO provide assistance "in identifying evaluation issues and synthesizing evaluative information relevant to conservation programs" and "in specifying the information needed from the executive departments and agencies to support the Committee's oversight." After reviewing program-related documentation, handbooks, and reports, we helped the Committee to prepare a letter to the Secretary of Agriculture, dated December 1, 1976, containing questions the Committee wanted USDA to answer. To answer these questions, USDA formed a Land and Water Conservation Task Force, which completed an initial report on December 1, 1977, and a final report on February 13, 1979. While these reports were underway, the Congress enacted the

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1/See app. I of this report.

Soil and Water Resources Conservation Act of 1977 (RCA) (Public Law 95-192), which provides for, among other things, a comprehensive appraisal of soil and water resources, a continuing evaluation of USDA soil and water programs, and the development of a unified program for land and water conservation efforts. In view of the requirements under the RCA, the efforts of the Land and Water Conservation Task Force were treated as background for implementing the RCA.

During this period, we further assisted the Committee staff by interpreting the intent of our initial questions, identifying evaluation issues, and specifying information required for Committee oversight. Based on many discussions with USDA personnel, we have developed the set of questions and guidelines included in this report to provide the Congress with a systematic framework for use in congressional oversight, as well as to provide USDA with our insights as to what should be included in evaluating their programs.

Our questions establish a starting point for evaluating the programs. It is not necessary to answer all of them in order to make progress in evaluating the programs. We concentrated on developing questions that we believe will help program managers and decisionmakers to analyze programs in terms of their impact. Although our questions may have implications for program management, this report is not intended to be an analysis of management procedures.

CHAPTER 2

RATIONALE FOR EVALUATION FRAMEWORK OF USDA SOIL AND WATER CONSERVATION PROGRAMS

The information needed from USDA to support congressional oversight of the soil and water conservation programs is very similar to that needed for program evaluation. The similarity is sufficient to permit us to apply the general concepts of program evaluation as a guide to specify the information and as a checklist to determine if the required information is being provided.

In applying the concepts of program evaluation, it is necessary to understand how and by whom decisions are made at every level in the operation and management of the programs. In the case of USDA's conservation programs, this may involve

- --individuals (principally farmers) and groups (such as associations and local units of government) who install conservation practices,
- --operating personnel at USDA local field or regional offices,
- --operating personnel at USDA State offices,
- --program managers operating at USDA headquarters,
- --USDA agency administrators,
- --USDA policy and budget officials,
- --OMB policy and budget officials, and
- --the Congress, including authorizing and appropriations committees and subcommittees.

With this understanding, it is possible to develop a framework for evaluating the programs. Our framework identifies the information we believe is necessary for making better day-to-day operation and management decisions.

We recognize that adopting the framework and establishing information flows will be a complicated process. However, many facets of the framework are already in place and much of the required information is already available--although there may be no existing formal mechanism for conveying the the desired information to the Congress.

We believe the evaluation framework for USDA programs that we describe in this chapter can serve as a model for developing evaluation frameworks for other programs or groups of programs, within USDA or in other agencies. This can be done by using the questions in appendix IV after removing specific references to soil and water conservation.

CONGRESSIONAL OVERSIGHT NEEDS

In recent testimony, we recognized "a growing consensus on the need to improve congressional oversight." We stated that "oversight is the process by which Congress learns about the implementation, results, effectiveness, and adequacy of the laws it has enacted and the programs it has authorized and funded." 1/

We indicated that oversight requires the Congress to "acquire knowledge about the operation and results of laws and programs" and to "provide for the collection and reporting of information on programs and their results." We supported the need for clear statements of program objectives to enable systematic monitoring and evaluation of programs.

In the report, "Finding Out How Programs Are Working: Suggestions for Congressional Oversight" (PAD-78-3, November 22, 1977), we suggested that a disciplined process be established "for agencies to follow in monitoring, evaluating, and reporting on their programs in order to answer congressional oversight questions." We further indicated the importance of committee and agency agreement on "the oversight questions which are most important and on the evaluation measures which can satisfactorily answer those questions."

In summary, we believe that congressional oversight requires as clear an understanding as possible between the Congress and an agency on (1) program objectives stated in or derived from the law and (2) the type of information that will accurately portray how well those objectives are being met. Therefore, the request we received from Senators Talmadge and Dole of the Committee on Agriculture, Nutrition, and Forestry essentially requires that we facilitate this understanding. 2/

1/Statement of Elmer B. Staats, Comptroller General of the United States, before the Subcommittee on the Legislative Process, House Committee on Rules, on H.R. 2 and H.R. 65, Congressional Oversight Reform Legislation, May 23, 1979.

2/See app. I of this report.

Information requirements can be specified by questions

In response to the Committee's request to specify information requirements, we first sought to understand the purposes of USDA's soil and water conservation programs. We could then identify the information that would inform the Congress about how well the programs are operating and being managed.

As will be seen, the amount of information which seems pertinent is very extensive. As a result, we felt that the required information would be more clearly specified by a series of questions grouped according to the type of issues addressed. Taken together, these questions can serve as a checklist against which information submitted by USDA can be judged for complete coverage of issues relevant to congressional oversight.

Questions implicitly express expectations about how programs should be operated, managed, and evaluated

We developed the questions from legislation, regulations, and handbooks pertaining to the various programs. This program-related documentation essentially describes what each program is expected to do and how this is to be accomplished. Although such descriptions may not completely reflect what the programs are accomplishing or how they are being operated and managed, we believe that the criteria for judging the program that emerge from this documentation should be taken at face value until the inappropriateness of any criterion is demonstrated.

As will be seen, our questions are essentially equivalent to those addressed in program evaluations. 1/ As a result, we believe that the questions posed in this report form an evaluation framework that simultaneously (1) specifies information required for congressional oversight of the several programs; and (2) delineates criteria which should be used for evaluating the accomplishments, operation, and management of the programs. In this respect, the questions may have an effect on how the programs are operated and managed.

1/See, for example, the questions posed in our recent exposure draft, "Assessing Social Impact Evaluations: A Checklist Approach," U.S. General Accounting Office, PAD-79-2, October 1978.

DESCRIPTION OF SOIL AND WATER CONSERVATION PROGRAMS

The elaboration of a comprehensive evaluation framework ultimately requires an understanding of the programs themselves and the environment in which they operate. Tables 1 and 2 identify 30 USDA programs that are considered to have soil and water conservation purposes. These 30 programs are subdivided into 18 action programs (table 1) and 12 supporting programs (table 2). In general, the action programs provide some form of assistance to individuals or groups who install conservation practices, while the supporting programs provide data and general planning assistance to the action programs. (Of course this distinction is not absolute; in many cases, some aspects of one program type are included in the other.) For the most part, our evaluation framework is concerned with the action programs.

Soil and water conservation includes many concerns

The first step in developing an evaluation framework for these programs is to identify their purposes. In the final analysis, the main purpose of these conservation programs is to ensure that the nation's food and fiber needs will continue to be met by protecting the capacity of the resource base which satisfies these needs. Although the primary focus in achieving this purpose is on the productivity of the nation's croplands, there are also many secondary purposes, such as (1) erosion control, irrigation efficiencies, and drainage problems; (2) water quality problems caused by agricultural and silvicultural activities; (3) water supply issues; (4) fish and wildlife habitat and recreation issues; and (5) flooding problems. These secondary purposes, in turn, break down into more and more specific concerns with which these conservation programs deal. One such list, not intended to be definitive, is shown in table 3. It illustrates the breadth and the depth of the issues that may be included within the general purpose of soil and water conservation.

To meet these purposes, each of the 18 action programs seeks to bring about the installation or implementation of conservation practices by farmers, landowners, associations, and units of government (such as soil conservation districts, drainage districts, towns, counties, and States). These practices, some of which are shown in table 4, are specifically designed to meet one or more of the purposes listed in table 3.

Table 1

USDA Action Programs
for Soil and Water Conservation

Agricultural Stabilization and Conservation Service (ASCS)

- Agricultural Conservation Program (ACP)
- Water Bank Program
- Emergency Conservation Measures

Farmers Home Administration (FmHA)

- Association Loans for Irrigation and Drainage and other Soil and Water Conservation Measures
- Resource Conservation and Development Loans
- Watershed Loans
- Soil and Water Loans to Individuals

Forest Service (FS)

- State and Private Forestry
- National Forest System

Science and Education Administration-Extension (SEA-E)

- Land and Water Conservation Education

Soil Conservation Service (SCS)

- Conservation Operations-Technical Assistance (COP)
- Watershed Operations
- Flood Prevention Operations
- Emergency Watershed Operations
- Resource Conservation and Development Program
- Great Plains Conservation Program
- Rural Clean Water Program
- Rural Abandoned Mine Program

Table 2

USDA Supporting Programs for
Soil and Water Conservation

Economics Statistics Cooperative Service (ESCS)

- Resource Economic Service
- River Basin Planning Assistance

Forest Service (FS)

- Forest Research

Science and Education Administration-Agricultural Research (SEA-AR)

- Soil, Water, and Air Sciences Research

Science and Education Administration-Cooperative Research (SEA-CR)

- Cooperative Research in Agriculture and Forestry

Soil Conservation Service (SCS)

- Cooperative River Basin Studies
- Watershed Planning
- Inventory and Monitoring Program
- Flood Plain Management Assistance Program
- Soil Survey Program
- Snow Surveys and Water Supply Forecasting
- Plant Materials Center Operations

Table 3

Purposes of USDA
Soil and Water Conservation Programs

Wind Erosion

Reduce wind erosion

Timber Productivity

Increase timber productivity
Reduce timber losses

Outdoor Recreation

Improve water based recreation
Improve land based recreation

Pasture/Range Productivity

Improve vegetation
Reduce damage by livestock
Increase soil moisture availability

Cropland Productivity

Improve soil fertility
Increase soil moisture availability
Improve tilth and structure

Watershed Protection

Reduce sheet erosion
Increase channel stability
Reduce gully erosion
Reduce construction area erosion
Reduce stream sedimentation
Prevent water pollution

Land Reclamation

Restore mined areas
Improve saline soils

Waste Management

Prevent degradation of land quality
Prevent water pollution

Flood Control

Reduce upland runoff
Reduce floodwater overflow
Reduce sedimentation
Reduce floodwater erosion

Drainage

Reduce excess surface water
Improve subsurface drainage
Prevent water pollution

Habitat Development

Improve fish habitat
Improve wetland wildlife habitat
Improve upland wildlife habitat

Irrigation Water Management

Improve distribution efficiency
Improve water use efficiency
Reduce irrigated land erosion
Improve quality of return flows
Reduce salt accumulation
Improve subsurface drainage

Water Supply

Increase soil moisture
Increase ground water supply
Increase surface water supply
Prevent water pollution

Source: Impact and Capability of Soil and Water Conservation Practices, Volume 1, USDA Land and Water Conservation Task Force, Washington, D.C., January 1979, p. 15.

Table 4

Soil and Water Conservation Practices

Access road
Bedding
Brush management
Channel vegetation
Chiseling and subsoiling
Clearing and snagging
Commercial fishponds
Conservation cropping system
Conservation tillage system
Contour farming
Contour orchard and other fruit area
Cover and green manure crop
Cricital area planting
Crop residue use
Dam, diversion
Dam, floodwater retarding
Dam multiple-purpose
Deferred grazing
Dike
Diversion
Drainage land grading
Emergency tillage
Farmstead and feedlot windbreak
Fencing
Field border
Field windbreak
Firebreak
Fish raceway
Fish stream improvement
Fishpond management
Floodwater diversion
Floodway
Grade stabilization structure
Grassed waterway or outlet
Grasses and legumes in rotation
Grazing land mechanical treatment
Heavy use area protection
Hedgerow planning
Hillside ditch
Irrigation canal or lateral
Irrigation field ditch
Irrigation land leveling
Irrigation pit or regulating reservoir
Irrigation storage reservoir
Irrigation system
Irrigation system, tailwater recovery
Irrigation water conveyance
Irrigation water management
Land clearing
Land smoothing
Lined waterway or outlet
Livestock exclusion
Minimum tillage
Mole drain
Mulching
Obstruction removal
Open channel
Pasture and hayland management
Pasture and hayland planting
Pipeline
Planned grazing systems
Pond
Pond sealing or lining
Prescribed burning
Proper grazing use
Proper woodland grazing
Pumped well drain
Pumping plant for water control
Range seeding
Reclamation of surface mined land
Recreation land grading and shaping
Recreation trail and walkway
Rock barrier
Row arrangement
Sediment basin
Spoilbank spreading
Spring development
Stock trails and walkways
Streambank protection
Stream channel stabilization
Stripcropping
Structure for water control
Stubble mulching
Subsurface drain
Surface drainage
Terrace
Toxic salt reduction
Tree planting
Trough or tank
Vertical drain
Waste management system
Waste storage pond
Waste storage structure
Waste treatment lagoon
Waste utilization
Waterspreading
Well
Wildlife upland habitat management
Wildlife watering facility
Wildlife wetland habitat management
Windbreak renovation
Woodland direct seeding
Woodland improved harvesting
Woodland improvement
Woodland pruning
Woodland site preparation

Source: National Handbook of Conservation Practices, USDA Soil Conservation Service, Washington, D.C., November, 1977.

The purposes of the soil and water conservation programs and practices form an essential component of the evaluation framework because they are the yardsticks against which the programs must ultimately be assessed.

Programs have distinctive and common characteristics

The evaluation framework must be capable of assessing the programs in terms of their distinctive and their common characteristics. Because the programs have similar and sometimes overlapping purposes, the evaluation framework must also provide for the assessment of the relative efficiency with which the end goals are achieved.

Evaluating the programs requires more than an assessment of each against the full spectrum of conservation purposes. First, each program is not intended to deal equally with all conservation purposes; some programs have a more limited range of purposes, as shown in table 5. Second, each program was enacted to satisfy conservation purposes in a unique way. The programs may differ as to (1) the type of practice installed, (2) the type of assistance provided (loans, cost-sharing, technical assistance, education, or resource management), (3) the class of the recipient, (4) the geographic location, or (5) the class of land to be treated. (A brief description of each program is given in appendix II.)

Despite their differences, all the action programs are operated in a similar fashion, although they are managed by different agencies within USDA. The direct participants (i.e., the line of authority) in the programs are shown in figure 1. Each program is assigned to a particular agency which then makes the program available to recipients through its own State and local offices. (There may be slight variations depending on the program and the agency's organization.) The recipient must request the type of assistance desired from the appropriate agency's local office. Actually, the programs do not operate as simply as they are depicted in figure 1. In practice many more participants are involved in their operation. Local citizen committees advise the local USDA offices; the local, State, and national offices of USDA interact continuously; and many Federal, State, local, and private organizations outside USDA formally participate in

Table 5

Conservation Programs and Their Purposes

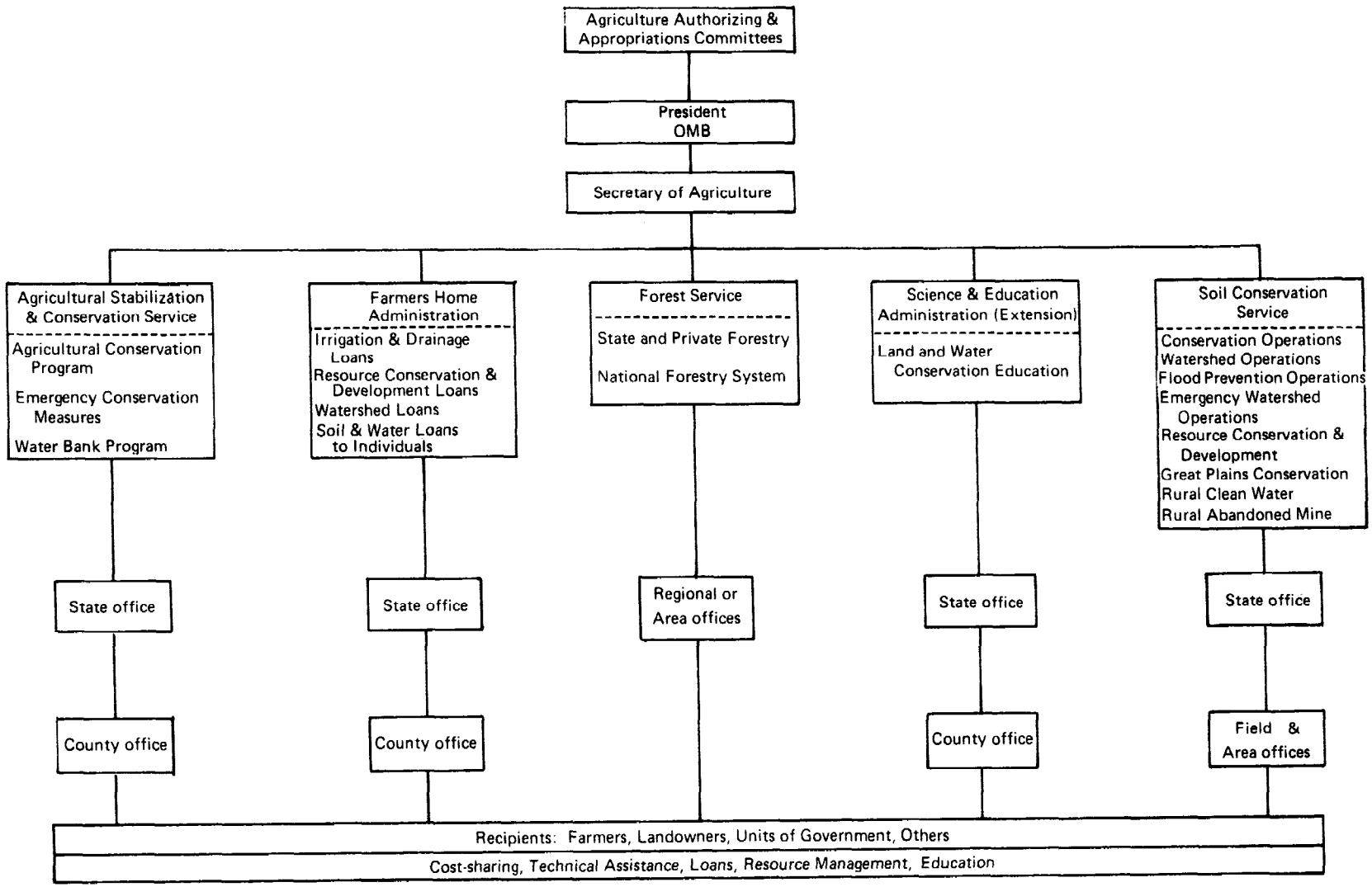
Agency	Conservation Program	Conservation Purpose [a]														Type of Program
		Flood Control	Land Reclamation	Water Supply	Timber Productivity	Watershed Protection	Wind Erosion	Pasture/Range Production	Water Quality Improvement	Waste Management	Irrigation Management	Drainage	Cropland Productivity	Habitat Development	Outdoor Recreation	
ASCS	Agriculture conservation	4		5	1	5	5	3	5	5	5	1	5	2	1	Cost-sharing
	Water Bank	5		5		5	1							5	4	Cost-sharing
	Emergency Conservation	1	5	5		4	5	2	5	4	5	3	3	4		Cost-sharing
FmHA	Irrigation & Drainage Loans	5	3	5	1	4	4	5	3	1	5	5	3	1		Loans
	Watershed Loans	5	3	5	3	5	5	4	3	3	5	4	4	3	3	Loans
	Resource Conservation Loans	5	4	5	4	5	5	5	3	4	4	5	3	3	3	Loans
	Loans to Individuals	5	4	5	4	4	5	4	3	3	5	5	3	2	1	Loans
FS	State & Private Forestry	4	3	3	5	5	3	2	2	1				5	2	Tech. Assistance
	National Forest System	3	4	4	4	5	1	4	2	3				5	5	Resource Mgmt.
SEA–E	Conservation Education	4	1	3		5	4	3	4	2	4	4	4			Education
SCS	Conservation Operations		3	4	3	5	5	4	4	3	5	2	5	3	1	Tech. Assistance
	Watershed Operations	5		4	4	5	2	4	4	2	4	2	3	4	3	Cost-sharing/Tech. Asst.
	Flood Prevention	5		4	4	5	4	4	4	4	5	4	4	4	4	Cost-sharing/Tech. Asst.
	Emergency Watershed					5										Cost-sharing/Tech. Asst.
	Resource Conservation	3		3	2	3			4	3	3	1	3	3	3	Cost-sharing/Tech. Asst.
	Great Plains Conservation	1		4	2	5	5	2	4	3	4		2	2		Cost-sharing/Tech. Asst.

[a] The most important purpose of each program is assigned a value of 5 with other purposes rated relative to this one on a scale from 1 to 5. If no rating is shown, the purpose is not relevant to the program.

Source: *Overview: Program Linkages*, USDA Land and Water Conservation Task Force, Washington, D.C., December 1978.

Figure 1

Participants in Delivery of Soil and Water Conservation Programs to Recipients



the programs. 1/ These operational similarities will facilitate the development of that part of the framework concerned with program operations, since the same basic questions will be applicable to each program.

DECISIONMAKING FOR SOIL AND WATER CONSERVATION PROGRAMS

Although many questions for the evaluation framework can be developed from statements of program purposes, we believe that the principal criterion for judging a question's value is the extent to which the answer provides information that can help make decisions about the operation and management of a program or program activity. Such decisions include budget allocation and policy decisions, and decisions made by any program participant--from the recipient to the Congress. Therefore, an understanding of the decisionmaking processes which are, or should be, used for soil and water conservation programs is important in developing the evaluation framework.

Figure 2 shows the current decisionmaking process for the soil and water conservation programs. Budget requests move up through the paths of authority and responsibility, resulting in appropriations for each program. The subsequent allocations of the appropriated funds move down to the recipient, who installs the conservation practices. This generalized process may vary slightly from program to program, but it is unlikely to change significantly; hence, it can serve as the starting point for developing the framework.

Current decisionmaking uses inadequate procedures and information

The next step in assessing the adequacy of the existing decisionmaking process is to examine (1) the procedures followed in making decisions and (2) the information used in applying and developing such procedures. Although we have not exhaustively studied the procedures and information now in use, we believe that they should not be the basis for the evaluation framework.

In a recent GAO report, "To Protect Tomorrow's Food Supply, Soil Conservation Needs Priority Attention" (CED-77-30, February 14, 1977), we observed that conservation problems

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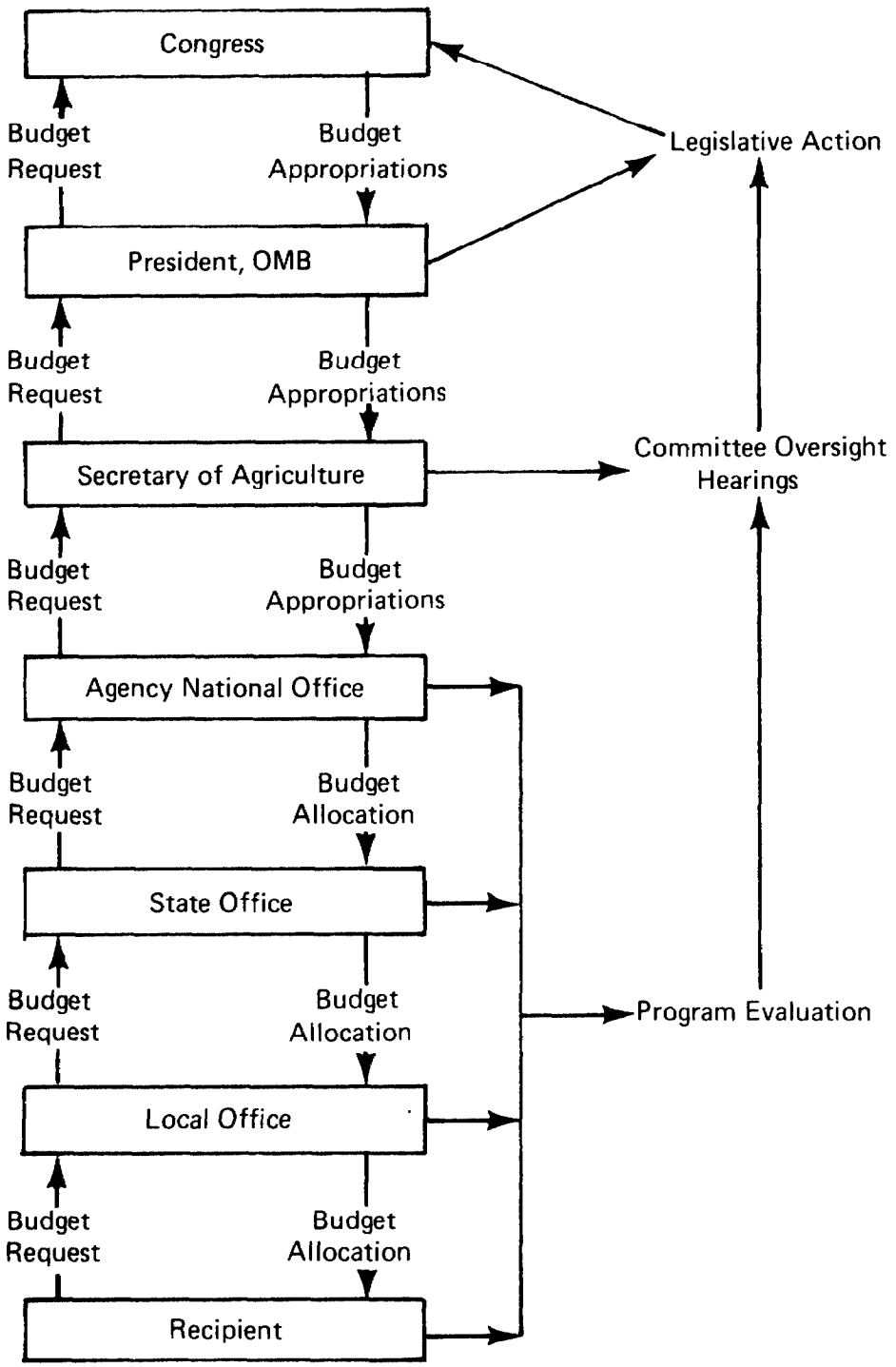
1/For details of the interactions among all action and supporting programs, see "Overview: Program Linkage," USDA Land and Water Conservation Task Force, Washington, D.C., December 1978, and its accompanying appendix.

Figure 2

Generalized Decisionmaking Process
USDA Soil and Water Conservation Programs



were not assigned priorities and that available resources were not directed toward solving the most pressing problems. In effect, this observation questions the adequacy of existing procedures for making decisions. USDA also recently observed (Executive Summary, USDA Land and Water Conservation Task Force, Washington, D.C., December 1978) that most agency reporting systems reflect only intermediate program accomplishments, such as miles of pipeline, acres treated, and number of loans, and that this information has limited utility in analyzing the relative effectiveness of the several programs. Since this is generally the only type of information provided by USDA local offices, it follows that decisions cannot be based on information about the impact or relative effectiveness of the programs. From this, we conclude that information used in existing decisionmaking processes is not adequate.

The Congress also expressed dissatisfaction with the current procedures and information for these programs by passing the RCA. In the Senate report on the bill (No. 95-59), the Committee on Agriculture, Nutrition, and Forestry expressed concern as to what is being purchased with soil and water conservation monies and whether the expenditures have been consistent with needs.

Evaluation framework is based on information about the effects of practices

Although current decisionmaking procedures and information reporting systems do not provide an acceptable evaluation framework, this does not mean that the actual installation of conservation practices is inadequate. In the first place, there is substantial quantitative information that describes many conservation problems, and this information is used to some extent to allocate funds. Furthermore, the large number of participants in the decisionmaking process provides some assurance that most conservation practices are needed. Finally, detailed methods have been developed by USDA's research community to estimate the effects of most conservation practices. The principal difficulties with this information are that (1) it is so voluminous and complex that it has not yet been fully integrated into the budget allocation process, and (2) it is not brought together at the local level and reported up to other decisionmakers. Consequently, there is still a significant gap in procedures for determining whether program incentives induce recipients to adopt the desired conservation practices.

Therefore, our evaluation framework is based on a substantial amount of information about conservation problems and practice impacts. We recognize that this information

may still have many gaps and may not be in a form that can be reported immediately, but part of our purpose in providing this framework is to uncover whatever information is available, and to put it in a form suitable and useful for congressional oversight.

EVALUATION FRAMEWORK FOR SOIL AND WATER CONSERVATION PROGRAMS

The conceptual basis of our evaluation framework is shown in figure 3 as a series of steps organized into four components we believe should be included in the operation and management of the soil and water conservation programs. These steps also constitute procedures that we suggest be followed in the budgetmaking process at the local, State, national, and congressional levels. The framework also specifies the information required to perform each step.

To a large extent, the framework is a model of procedures already followed, although perhaps somewhat informally with less quantitative and more subjective information. However, in highlighting these procedures we intend the framework to serve as the basis for the improved use of information in oversight and management.

Decisionmakers need a common view of what programs are designed to accomplish

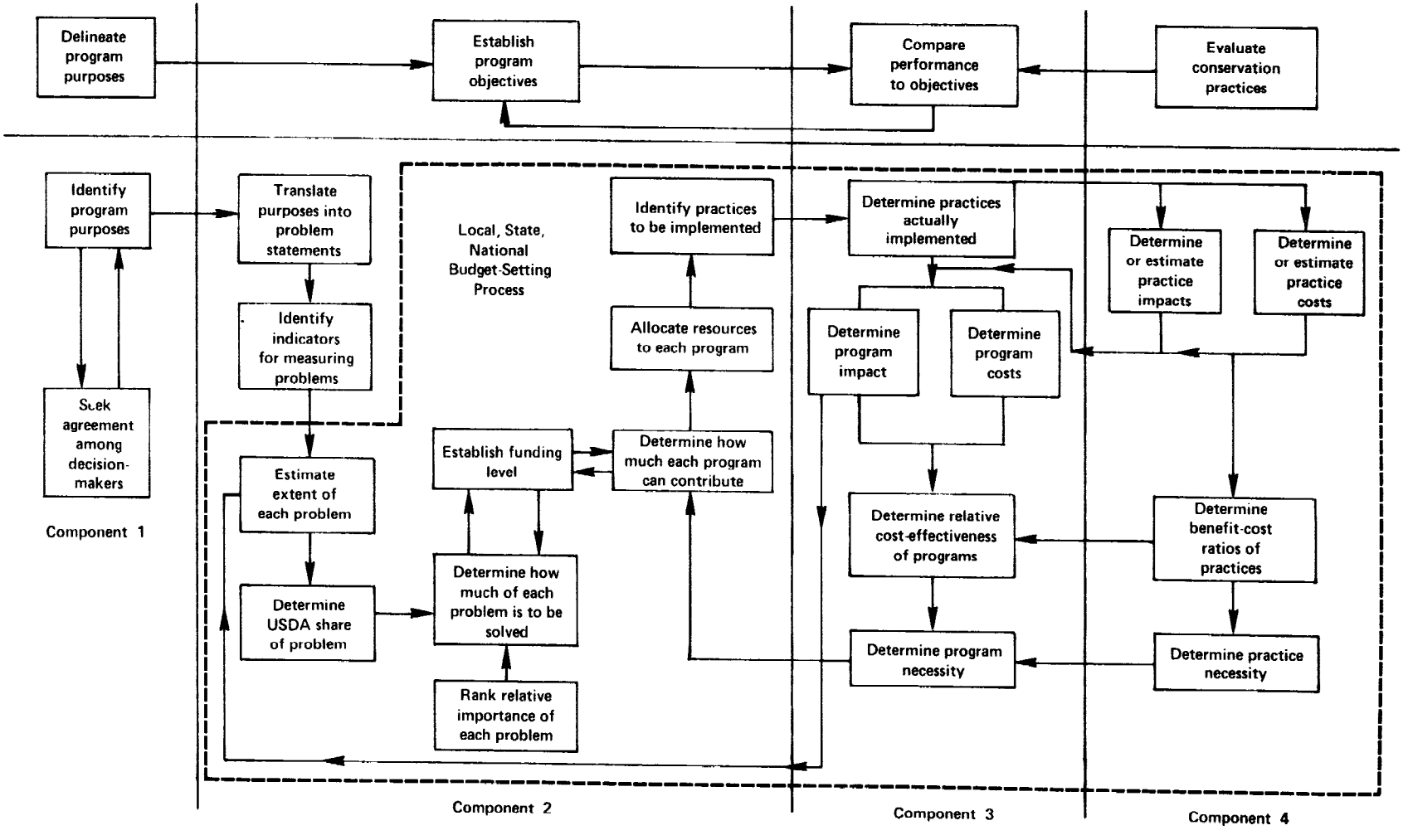
The first component of the framework is concerned with how decisionmakers, particularly program managers and the Congress, agree on what the programs are expected to accomplish. Program purposes may be stated vaguely in enabling legislation or, when the program is implemented, they may be interpreted differently than the Congress intended. To forestall such difficulties, the executive branch and the Congress should work to reach agreement on the purposes of the programs.

Expectations for level of program performance provide criteria for evaluating programs

The current budgetmaking process establishes the inputs for a program, such as personnel levels and amount of cost-sharing, but it seldom indicates what is being purchased with program funds. Even where some program outputs are included in the budget justifications, these outputs generally portray intermediate program results and do not describe the extent to which program purposes are being satisfied. The second component of the evaluation framework is designed to express program accomplishments in terms that correspond to the purposes and then to make explicit the level of performance at

Figure 3

Conceptual Basis of an Evaluation Framework
for USDA Soil and Water Conservation Programs



which the program is expected to operate. The purpose of doing this is to help legislators and policymakers decide the level at which they wish the program to operate. In this way, objectives can be based on what can be accomplished, rather than simply on the level of funding.

Two types of information are involved in setting objectives: information on the extent of each conservation problem, and estimates that indicate how much of a problem can be solved at different funding levels. With this information, policymakers can see how much it will cost to attain different levels of problem solving and then select the level that they want.

Information on the extent of each problem requires (1) a clear description of existing problems, (2) acceptable indicators for measuring the problems, and (3) acceptable procedures for making accurate estimates of the extent of each problem. Estimates of how much each program can accomplish at different levels of funding come from the second component of the evaluation framework.

With this information, the decisionmaker needs to determine what portion of the problems fall within USDA's responsibility and rank the relative importance of each problem before deciding how much of each problem is to be dealt with. (The decisionmaker may use the public's perception of values in ranking the problems.) If the evaluation framework is followed, this decision will lead to a corresponding funding level for the programs. (As now performed, the decisionmaker reverses this order by using the funding level as the criterion for deciding what performance level is desired.) The established funding level will then dictate how much will be allocated to each program and this in turn should indicate which practices should be implemented. As will be described below, the configuration of practices and programs maximize the benefits for whatever funding level is chosen.

Program evaluation is concerned with what actually occurs

Program evaluation is generally viewed as an activity performed at periodic intervals. Because of this, the principal purpose of evaluation is usually to determine whether the actual performance of a program corresponds to what was expected, and, if not, to provide decisionmakers with appropriate information to enable them to adjust the program or even to terminate it. This purpose is important when there

is a large discrepancy between what a program actually can accomplish and what it was hoped to accomplish. Used in this way, evaluation holds program managers accountable for the achievements of their programs.

However, since an evaluation attempts to describe what a program is actually accomplishing, periodic evaluation does not take full advantage of evaluative information. We believe that the evaluation process should provide information continually about program accomplishments in order to facilitate decisions in the daily operation and management of the programs.

The third component of our evaluation framework is intended to generate evaluative information. Such information can help improve the program performance achieved from a specified level of funding and suggest appropriate adjustments to the program and its level of funding as conditions warrant. This requires (1) identifying conservation practices actually implemented and (2) estimating their actual impact and cost. From this information, it should then be possible to determine whether and how program performance can be improved and, as a result, to make adjustments in the program and practice configurations. This information should then be fed back into the steps for establishing program objectives and funding levels.

Since the impact of most conservation practices does not occur for many years, the "actual" impact cannot be measured immediately upon the implementation of a practice. As a result, USDA must develop and adopt procedures for validating estimates of these impacts.

The intent of the evaluation framework to provide evaluative information continuously does not remove the requirement of determining discrepancies between expectations and actual results. Any such discrepancies lessen the quality of the information upon which decisions are to be based. Discrepancies may indicate poor management as well as an inaccurate predictive capability. It is therefore necessary to identify the reasons for any discrepancies so that any managerial or operational problems may be resolved.

Practice evaluation provides the information upon which the evaluation framework is based

Ultimately, each USDA soil and water conservation program achieves its purposes and objectives through the installation or implementation of conservation practices. In turn, each conservation practice is the culmination of many years of

research to develop ways by which particular conservation problems can be overcome. This research, along with experience gained from actual installation, leads to specifications on how the practice is to be installed and the conditions where the practice is applicable. Acceptance of a practice by researchers, by those recommending its installation, and by those installing the practice comes from a demonstration that its returns, perhaps with financial assistance, are greater than its costs. Moreover, the practices, their specifications, and the knowledge about where they should be applied are continually being improved.

In the same way that the success of the programs ultimately depends on the practices that are installed, the success of the evaluation framework depends upon information about these installations. It is impractical, and probably impossible, to measure the actual impact and cost of each practice which is installed; this requires precisely controlled experimental conditions. However, a large amount of information about practice installation is prepared when assistance is provided under the USDA programs, but very little of this information is ever employed beyond the source of its development. In addition, relatively little of the research results obtained in developing practices is ever combined or exploited beyond the specifications of a practice or the conditions where it should be applied. It is not known how far this information can portray the impact and cost of installed practices, but it is clearly beyond what is now done.

The fourth component of the evaluation framework is therefore intended to generate the conservation practice impact and cost information that is required to assess the impact and cost of programs. This is, of course, not all the information required in the evaluation of the programs, but it is a significant portion. This information about practice impact and cost is also necessary to determine the basic utility of the practice, i.e., whether practices as installed are performing as expected.

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In the next three chapters, the procedural and information requirements of the evaluation framework are provided in greater detail. Chapter 3 elaborates on the procedures and information requirements for delineating program purposes and establishing program objectives. Chapter 4 details the requirements for evaluating the programs, and chapter 5 does this for evaluating conservation practices. The discussions in these three chapters can be used as guidelines for ensuring that the relevant evaluation issues have been considered.

The issues have also been cast in the form of questions to provide a checklist that summarizes the content of each discussion. All the questions included in the next three chapters have been grouped into one list in appendix IV.

In the discussion in chapter 3 about establishing program objectives, the procedures include a step for determining the extent of each conservation problem. This discussion does not identify specific problems; further guidance on specific areas is provided by detailed questions in appendix III.

In chapter 4, the procedural and information requirements for evaluating the programs are presented in general terms, and are applicable to all conservation programs. To help apply these guidelines to specific programs, we have developed further questions for each program. These questions are included in appendix II.

ADOPTING AND IMPLEMENTING THE EVALUATION FRAMEWORK

The procedural and information requirements specified in the evaluation framework are intended to serve as guidance on how the programs should be operated and managed as the basis for providing information to be used in congressional oversight. The framework is not intended to lay out the requirements for a massive data-gathering system, but rather to suggest what should be considered in developing evaluation plans to be carried out by USDA and by individual agencies with respect to soil and water conservation programs.

To use the framework, USDA must make a commitment to develop and implement a comprehensive evaluation plan. In making such a commitment, USDA needs to ensure (1) that evaluators from all agencies with soil and water conservation programs, activities, and concerns are involved, and (2) that these evaluators have the authority to engage their agencies and the appropriate program managers in the development of an evaluation system that will cover all programs individually and as a group. The evaluators' first task in designing an evaluation system is to identify its conceptual basis. We believe that the concepts portrayed in figure 3 are an appropriate model of what needs to be considered.

After developing a conceptual basis, the evaluators must begin to fill in the details of each component and step. Chapters 3, 4, and 5 present our view of some concepts and concerns which should be considered in each component. The evaluators need to consider what we have presented and assess its validity in light of their own experience (adding, deleting, or modifying the details as required) as part of

identifying the issues to be dealt with by the evaluation system. During the design phase, the evaluators should interact extensively with the program managers in their respective agencies. Such interaction takes two forms: (1) the evaluators indicate to the program managers what evaluation requirements should be met, and (2) the program managers provide feedback to the evaluators about the appropriateness, usefulness, and feasibility of satisfying such requirements.

Adopting and implementing the evaluation framework essentially means that evaluators must formally consider the concepts and concerns that we address in chapters 3, 4, and 5. The questions, procedures, and information requirements specified in our framework, or by the evaluators, must be systematically examined; this entails, among other things,

--determining what specific data should be used in each part of the evaluation system;

--identifying how the data can or should be used, and by whom;

--determining the form in which data should be presented to each decisionmaker;

--delineating the procedures to be followed in gathering the data and ensuring its flow to the decisionmaker;

--determining the cost of gathering the data, including the costs of any additional administrative services that might be required, the costs of training personnel in data gathering or reporting, and the costs of updating and maintaining any data gathering system;

--assessing the probable accuracy and reliability of the data; and

--assessing the value of the data compared to its cost and deciding whether data should be included in the evaluation system.

During this examination phase, each question in the framework should be carefully scrutinized to determine its relevance, the usefulness of an answer to it, and the practicality and reliability of obtaining an answer. Any modifications, additions, and deletions to the questions can be made at that time.

We believe that adopting and implementing the framework will make better use of information that may already be

available, but which is currently used only for very limited purposes. We believe that this unused information can be put to good use in operating and managing the programs, in budget-setting, in policymaking, and in congressional oversight, but this can happen only if current procedures are substantially changed to emphasize what the programs are accomplishing. We recognize that such a reorientation will take a long time, first in identifying the specific actions that are required and then in actually implementing those actions, but we believe that such a reorientation is necessary.

RECOMMENDATIONS TO USDA

We recommend that USDA develop a plan leading to an evaluation system covering all soil and water conservation programs. In developing this plan, USDA should consider the questions, procedures, and information requirements detailed in the next three chapters and in the appendixes. In addition, those developing the plan should consider the relationship of any evaluation specifications to program management and reporting program progress. With respect to any program performance indicators and procedures, USDA should discuss these matters with committee staff before embarking on elaborate data gathering efforts and systems, and it should attempt to reach consensus on the value of such measures.

We also recommend that USDA include in its annual report required by the RCA statements on its progress and difficulties in trying to incorporate evaluation concepts into its management and reporting processes.

MATTERS FOR CONSIDERATION BY THE CONGRESS

In several reports and statements the Comptroller General has recommended that, in cases where evaluations are needed by the Congress, the Congress should work with agency officials to seek a common understanding of program objectives and acceptable performance measures and data for each program to be evaluated. In view of the complexity of the evaluation framework described in this report, implementation of the recommended evaluation plan will be incremental and can be expected to undergo many evolutionary changes as it is developed. Therefore, the Congress should review the evaluation plan and any reporting specifications. In this way the Congress can be sure that the information to be reported has the greatest possible usefulness to the decisionmaking and budgetsetting processes. The evaluation framework described in this report can assist in making such a review.

AGENCY COMMENTS AND OUR EVALUATION

USDA's comments on the draft of this report are reproduced in appendix V. USDA officials agreed with our recommendations, stating that they "have already begun the process of internalizing" the concepts and concerns "that must be considered in developing an evaluation system" and "that must become an integral part of program development, management, and evaluation***to carry out the mandates of Congress in an effective and efficient manner." USDA further stated its belief that its "evaluation activities will ultimately evolve into a standardized process which will meet the objectives and needs of the Congress."

USDA noted several laws under which the Congress has requested evaluations. We believe that our evaluation framework is consistent with these legal requirements and that it can, therefore, assist USDA to meet these requirements. We do not wish this framework to duplicate what is done under these authorities, but rather to provide guidance in satisfying their requirements.

USDA also described several current efforts to establish evaluation processes and to develop information that may be useful in evaluations. Although we have not examined these efforts in detail, we support them in principle. We would hope that the information developed in such systems is used in program management, in resource allocations, and in budget justifications.

CHAPTER 3

PURPOSES AND OBJECTIVES OF SOIL AND WATER CONSERVATION PROGRAMS

Successful oversight, management, and evaluation of the 18 soil and water conservation action programs listed in table 1, taken individually or as a group, dictate that we understand the problems the programs are expected to resolve. Broad statements of these problems may be contained in a statement of purpose or policy in the enacting legislation, although such statements may be vague and may not conform to a program's intended design (as embodied in the legislation), or to what is actually implemented by an executive agency. Statements of objectives or specific levels of performance expected from a program (e.g., how much of a problem is to be resolved in the next budget year) are seldom explicitly set forth, either in legislation or in budget justifications. Since statements of purposes and objectives provide the criteria for evaluating programs, ultimately it will be necessary for the executive branch and the Congress to try to reach agreement as to what they are.

The guidelines presented in this chapter are designed to assist USDA staff in delineating the purposes and the objectives of the soil and water conservation programs. It should be kept in mind that applying the guidelines is a continual process. Purposes and objectives will be subjected to frequent revision because of changing needs, new legislation, specific resource allocations, establishment of funding levels, and new agreements between the executive branch and the Congress. Such revisions are not likely to affect the guidelines unless there are major changes in the operation of the programs.

PROGRAM PURPOSES

A program purpose is a broad statement of a problem that a program is expected to resolve, at least in part. It is a generic description of what the program is intended to accomplish and usually gives the desired direction of the expected change, but it does not provide a quantitative indication of how much of the problem the program is expected to resolve. Examples of purpose statements are "to reduce wind erosion" and "to improve irrigation efficiency." Table 3 in chapter 2 lists some of the major purposes of USDA's conservation programs. To establish objectives or expected levels of performance for these programs, such purposes will eventually have to be made specific by identifying (a) quantitative measures of performance and (b) values of these measures which

the programs are expected to attain. However, it is first necessary to reach agreement as to what purposes are included under the heading of soil and water conservation.

USDA does not have a consolidated list of conservation purposes

USDA has developed several lists that may cover most conservation problems, but these lists are not consistent with one another and they have not been consolidated. Some of these lists can be found in

--"Soil and Water Resources Conservation Act National Manual," Soil Conservation Service, USDA, RCA Worksheet No. 1, Resource Concerns and Problems;

--"A Generalized Evaluation Approach for USDA Conservation Programs," USDA Land and Water Conservation Task Force, chapter III - Program Objectives and Purposes;

--"Impact and Capability of Soil and Water Conservation Practices," USDA Land and Water Conservation Task Force, volume 1, table 2.1-1;

--"LAWREMS - Land and Water Resources and Economic Modeling System," USDA Land and Water Conservation Task Force, table 3;

--"Response to Senate Committee Oversight Request, Program Questions on Need, Impact, and Operation," USDA Land and Water Conservation Task Force (Answers for each program to the question, "What are the purposes of the program?"); and

--"Proposed RCA Plan of Study," included as appendix B in "A Generalized Evaluation Approach for USDA Conservation Programs," USDA Land and Water Conservation Task Force.

In referring to purposes, these lists use varying terminology such as "objectives" and "resource concerns and problems." We believe that the term "objective" has the added connotation of a specific level of performance desired from a program and that the phrase "resource concerns and problems" does not carry a sense of the direction that is desired.

As the first step in implementing the evaluation framework, USDA should prepare a consolidated list of purposes. Such a list will ensure a clear understanding of what these programs are intended to accomplish and will provide the basis for establishing expected levels of performance.

Criteria for a list of conservation purposes

In preparing and reviewing a consolidated list of purposes, USDA should make certain that

a) The list of purposes is complete. Each distinct purpose of soil and water conservation practices, projects, and programs should be identified, even if the purpose is not considered to be very important. The question of importance is a separate issue to be addressed only after the purpose has been delineated.

b) The relationships among purposes are shown in the list. The lists mentioned above suggest nearly 200 distinct purposes of soil and water conservation. In several, the purposes are arranged hierarchically. Such an arrangement provides a better understanding of why particular purposes are included under soil and water conservation and later will make it easier to determine the relative importance of each purpose.

c) The purposes are meaningful and essential to soil and water conservation programs. At times, purposes are stated so vaguely that they provide little or no indication of what is actually intended by the program; e.g., "to bring about physical adjustments in land use." Some purposes, such as "to improve agriculture," are so broad that the contribution of soil and water conservation programs will be relatively minor. Unless the purposes are clearly related to soil and water conservation programs, an evaluation of the programs may invalidly show few benefits.

d) The purpose is stated in a way that allows quantitative measurement of progress toward meeting the purpose. One indication that a purpose has been satisfactorily articulated is when it is possible to identify the specific procedures for measuring progress toward attaining the purpose. For example, a purpose such as "to improve irrigation water management" cannot be used until the specific ways for improving irrigation are identified. There may be instances when precise measurement is not possible or has not yet been attempted, such as with the purposes "to assure the efficient multipurpose use of soil and water resources" and "to enhance the natural beauty of the landscape," but many purposes can be put into a measurable form.

e) The distinct delivery mechanism of each program has been included in the list of purposes. There are two distinct sets of purposes needed to describe USDA's soil and water conservation action programs. One set deals strictly with conservation itself, i.e., with soil and water resources and the concerns and problems associated with these resources. The purposes listed in table 3 are part of this set. The other set deals with the problem of persuading individuals and groups to adopt conservation practices--e.g., helping farmers finance practices.

Using a small list of 14 purposes, the USDA Land and Water Conservation Task Force determined the purposes associated with each program from the program managers. Table 5 of this report 1/ correlates the purposes and the programs. Some differences among the programs are apparent in this table, but most programs have a large number of conservation purposes and, in any event, the essential differences between programs are not shown.

The action programs are concerned with achieving conservation purposes through distinct delivery mechanisms including loans, technical assistance, cost-sharing, and education. Tax expenditures from favorable income tax treatment; regulatory programs of other agencies; direct resource management; and indirect methods, such as tying conservation to crop loan and price support programs, are other possible delivery mechanisms. Although the ultimate purpose of such programs is soil and water conservation, the delivery mechanism embodies a possible solution to the intermediate problem of getting individuals and groups to implement or install a soil and water conservation practice. Each program must be evaluated in this respect, in addition to its contribution to soil and water conservation. USDA has not yet attempted to develop a list of purposes which captures the essence of each delivery mechanism. Such a list is crucial to an evaluation of the relative effectiveness of the various programs and to a funding allocation among the programs.

1/Table 5 is taken from the Task Force's report: "A Generalized Evaluation Approach for USDA Conservation Programs," December 1978, pp. 13-15.

As shown in figure 3, chapter 2, USDA should try to reach agreement with the Congress on the purposes of the programs before objectives can be established. However, it is not necessary that a complete list be developed, since the delineation of purposes is a process that continues as programs and policies change. However, establishing objectives can begin when agreement between USDA and the Congress is reached.

The guidelines presented in this section can be summarized by the following checklist of questions.

1. What are the purposes of USDA soil and water conservation programs, individually and as a group?

2. Which purposes apply to each program?

3. Are the delivery mechanisms or unique features of each soil and water conservation program reflected in the list of purposes?

4. Has each purpose been stated so as to permit development of quantitative measures of progress?

5. Is each purpose essential only to soil and water conservation, or does it relate to some broader purpose? If the latter, how much should soil and water conservation programs be expected to contribute to the broader purpose?

6. What are the major soil and water conservation purposes; i.e., under which purposes can all others be grouped? Have the purposes been arranged hierarchically to show the relationships among them?

7. Has agreement been reached among all agencies as to the purposes of these programs?

PROGRAM OBJECTIVES

A program objective is a specific statement of how much of a problem indicated by a program purpose is to be resolved within a prescribed time frame. A program objective is thus a specific description of the expected level of performance for a program. An objective translates a purpose into specific operational goals.

Objectives may be established during the budget process when the funding level is set for each program. However, objectives are seldom made explicit in current budget justifications, and, for the most part, the information necessary to

make them explicit is not even available. The budget process establishes the inputs which are to be allocated to the program. These inputs, in turn, establish a level of program activity which is assumed to accomplish the purposes of the program to some extent. However, in most cases, the precise extent to which program purposes will be met is not shown in the budget justification. We believe that budget decisions should be based as much as possible on what a specified level of funding will accomplish in terms of program purposes.

The guidelines in this section are designed to correct the lack of information on how much will be accomplished in terms of program purposes. This is done by (1) describing the elements of the process by which objectives should be established and (2) identifying the information required during the different steps of the process. These guidelines correspond to the second component of the evaluation framework presented in figure 3, chapter 2. As noted earlier, part of the information used during this process is obtained by evaluating the programs. The quality of this process will therefore largely hinge on the quality of evaluative information. Without such information, the relationship between a program's activities and the accomplishment of program purposes cannot be considered in establishing program objectives.

Guidelines for translating program purposes into problem statements

The first step in establishing program objectives is to articulate the problems implicit in each program purpose. A problem statement essentially identifies the terms used to describe a problem. Each purpose identified during the first component of the evaluation framework must be analyzed to determine what problems are meant to be solved under that purpose. For example, a purpose can be "to reduce scouring on floodplains caused by water erosion." To set an objective for this purpose, we must first know how much scouring occurs now or may be expected to occur. Another purpose can be "to provide diverse recreation opportunities." In this case, it is desirable to know, among other things, (a) how much demand there is and will be for different types of recreation, (b) how much diversity is required at a single location (e.g. boating and swimming together), (c) what locations are potentially available to satisfy these demands, and (d) the extent to which these demands can be met with existing recreation facilities.

It is important to recognize that inventory systems do not in themselves automatically constitute problem statements,

although the information in such systems can often be used to articulate problems. For example, it is not sufficient to know that there is a particular amount of cropland in capability class IIe (land with some erosion susceptibility and past erosion damage, but which can be cultivated with few limitations). With the purpose "to control erosion," it is necessary to know how much erosion (and perhaps what types) is or will be occurring on such land before a concrete objective can be stated.

It is also necessary to indicate the kind of detail required to articulate problems. Thus, although it may sometimes be possible to make problem statements that are very broad (e.g., 3 billion tons of soil are being lost because of erosion), such statements may not be sufficient because they do not provide enough detail to determine precisely what actions might be required. For example, soil erosion can be subdivided at least by source and geographic location, each of which may require a separate problem statement, since it may be necessary to allocate funds to deal specifically with certain sources or locations. The amount of detail required for describing each problem will have to be determined case-by-case.

Findings of the USDA Land and Water Conservation Task Force emphasize the importance of describing problems by small geographic areas. Using 14 purposes and 41 subpurposes, it found that there were conservation problems unique to each area studied, and it cautioned against generalizing the priority of any problem to the national level. In general, each problem should be articulated for each county, the smallest geographic subdivision at which program resource allocations are made. However, some problems and needs should not be broken down to such a fine degree. For example, problems of water supply, food and fiber demands, and flooding may not be solvable at the county level--and hence may require decisionmaking within a small watershed or some larger region. The appropriate geographic unit will have to be determined for each problem statement. (We note at this point that the necessity for problem and need statements at the local level should not initiate a massive data-gathering effort in each county. The required information should be provided or adopted from existing data systems developed by the national offices of several Federal agencies. The responsibility lies within the headquarters of USDA to ensure that local offices have the information they need.)

The following question summarizes the guidelines in this section:

1. What soil and water conservation problems correspond to each purpose? Has the appropriate amount of detail necessary to describe each problem been identified?

Agreement is necessary on indicators to measure extent of problems

Many conservation problems that will have been identified in the first step have well defined indicators to measure their extent, while others, particularly problems which give rise to the need for specific programmatic delivery mechanisms (such as cost-sharing or technical assistance), have no such indicators. In either case, decisionmakers at all levels should seek agreement on what indicators to use for measuring the extent of conservation problems. These indicators should be the focus for most activities performed under the goal of soil and water conservation; i.e., management of the action programs should proceed from decisions based on the values of the indicators. Right now indicators are seldom used in program management, even when there is agreement on what indicators should be used. USDA must commit itself to using indicators by taking full advantage of available technical results and by developing indicators where none exist.

USDA should begin this process by drawing upon its own specialized technical and research expertise and that of agencies outside USDA. The current efforts to implement the RCA and the interagency agreement to classify and inventory natural resources (among SCS, FS, and the U.S. Department of the Interior Fish and Wildlife Service, Bureau of Land Management, and Geological Survey) may form the nucleus for this process, but much more appears necessary. USDA's Forest Service has established a research and development program to deal specifically with the difficulty in developing acceptable procedures for resource inventories and evaluations under the Forest and Rangeland Resources Planning Act of 1974 (Public Law 93-378). The magnitude and complexity of these efforts indicate that a similar effort for soil and water conservation will be even more extensive.

In developing descriptions and specifications for the indicators, USDA should identify how their actual values can be used in program management and decisionmaking. These descriptions eventually should be presented to program managers, policymakers, and congressional committees for their acceptance and approval, along with information on the pragmatic aspects of data acquisition, collection, and estimation described in the next section. In view of the extent of these requirements, initial efforts should be focused on the principal purposes of soil and water conservation.

It is difficult to provide specific criteria that can be applied to any proposed set of indicators to determine unambiguously whether such a set is complete and adequate for everyone's needs. Assessment of their adequacy is essentially subjective. The following questions may be helpful in this assessment.

2. What indicators must be used to describe each problem?

3. What criteria are used to ascertain whether each particular delivery mechanism is required?

4. Do the indicators describe the important aspects of each conservation problem?

5. For those conservation problems that do not now have acceptable indicators to measure the problem directly, what surrogate indicators can be used?

6. How can each indicator be used in program management or decisionmaking?

Additional questions that may help to identify acceptable indicators for specific programs and problems are contained in appendixes II and III.

Detailed procedures are needed to estimate the extent of problems

The process of identifying indicators becomes more complex when problems of data acquisition and collection are considered. As a result, procedures for using indicators and estimating their values must be delineated to ensure that decisionmakers have a clear understanding of how they can be used. This understanding is needed before decisionmakers can accept the indicators as an appropriate way to measure the extent of problems. Management controls may also be necessary to ensure that decisionmakers are properly using such indicators.

Requirements for describing estimating techniques

The basic requirement for describing estimating techniques is to show how the values of each indicator are determined. Generally, the procedure used to determine the extent of a problem falls into one of four categories, each requiring specific kinds of documentation.

--Direct measurement - For many USDA programs, direct measurements of problem extent are made. Some direct measurements may be available from agencies outside USDA. In many instances, such data may represent sporadic coverage, either geographically or temporally. For example, data are collected by USDA and other agencies on the sediment level of reservoirs, but such data are not complete, nor are they collected continuously. In any instance where direct measurement of some problem is made, it is necessary to identify precisely what the data represent and whether there are any limitations on the use of such data.

--Statistical sampling - In many cases, the principal difficulty in directly measuring the extent of a problem is that a monitoring or data collection system to do this would be so large as to be prohibitively expensive. Frequently in such cases, reasonably accurate estimates of the extent of a problem can be made by gathering data from a carefully selected number of representative places. Well-established statistical techniques can then be employed to estimate the extent of the problem from the sample. In this case, the technique used and the confidence levels achieved must be described, along with an indication of the geographic region where accuracy is assured.

--Descriptive models - Sometimes, the extent of a problem cannot be measured directly or estimated with a statistical sample. In such cases, the only way to proceed is to find a substitute measure that can be used to make the estimate. Generally, such substitutes are found only after considerable research yields a quantitative relationship by which the substitute measure can be used to compute the extent of a problem.

For these descriptive models, which may, for example, estimate erosion levels or farm budgets, it is necessary to identify the computational steps, the conditions where the models apply, and the underlying data which must be collected. Since use of descriptive models may involve direct measurement or statistical sampling of the substitute measures, the requirements listed above would also have to be fulfilled.

--Predictive and planning models - The preceding three methods will generally establish the current status of a problem or need. However, decisionmakers are normally required to anticipate the future by predicting the effect of their decisions on the status of the problem. Analysis of historical trends in the

status of a problem may enable predictions of the future status to be made. Analysis of past policy decisions and their effect on the status of a problem is needed to establish models that can be used to assess the expected change in the status from plans for alternative decisions in the future. Predictive and planning models must be described with the same level of detail as that required for descriptive models. These models may also incorporate descriptive models, data from statistical sampling, and direct measurements as components; descriptions of such components would have to satisfy the requirements listed above. It is also necessary to indicate the extent to which predictive and planning models have been validated; i.e., whether estimates of the future status of a problem have proven to be reasonably accurate.

For each purpose and its problem and need statements, it is necessary to identify which of the four estimating techniques is being used. A detailed description of the technique must also be prepared so that the reasonableness of the technique's assumptions can be assessed. This description must also identify the procedures used to determine the accuracy, reliability, and sensitivity of the estimates. When the estimates are presented, their accuracy, reliability, and sensitivity to changes in the assumptions should also be given. 1/

The requirements specified in this section are summarized by the following questions.

7. What procedures (direct measurement, statistical sampling, descriptive models, or predictive and planning models) are used to assess the extent of each problem?

8. To what degree has each predictive and planning model been validated?

9. What procedures are used to ensure the accuracy and reliability of the measurements and estimates used by USDA?

1/For some further criteria in reviewing models, see our recent report, "Guidelines for Model Evaluation," U.S. General Accounting Office, PAD-79-17, January 1979.

Potential sources of information may not be fully utilized

In addition to describing how to estimate the extent of each problem, USDA should identify the sources of information to ensure that it flows smoothly to the decisionmakers. Much information on the extent of soil and water conservation problems and needs is available in USDA or in other agencies with similar program purposes. Each of the action programs identified in table 1, chapter 2 generates substantial quantities of information during the course of its operations. One purpose of the supporting programs identified in table 2 is to develop information that can be used to assess soil and water conservation problems and needs. The information from both program types forms the nucleus for determining the extent of conservation problems and needs.

However, it does not appear that all the available information is being fully utilized; explicitly identifying the sources that can be used should encourage better use of this available information. This will be accomplished to some extent in the appraisal report that USDA is preparing in accordance with the requirements of the RCA. USDA's Land and Water Conservation Task Force has identified approximately 300 data sets and models that could be used in connection with soil and water conservation activities, but the Task Force concluded that its work was only an initial effort which must be continued if all these systems are to be incorporated into an evaluation framework. USDA has established a Land and Water Resource Economic Modeling System (LAWREMS) to facilitate wider use of these data sets and models in program development and evaluation.

It appears that local decisionmakers are not receiving all the information they need. Data gaps and needs are not well defined. Soil and water research results and models apparently are not incorporated or used in the decisionmaking process. Information in data systems operated by agencies outside of USDA does not seem to be used extensively. Identifying the sources of information for estimating the extent of problems should permit existing information to be exploited more fully and data gaps to be identified more easily.

The following questions summarize the concerns expressed in this section.

10. What sources of information can be used to estimate the extent of each problem?

11. What data systems or estimating procedures developed by other agencies are being used to estimate

the extent of problems? What modifications are being used by USDA?

12. Which conservation problems cannot be adequately described with existing data or estimating procedures; what steps are being taken to fill these voids? To what extent do the activities of the soil and water conservation supporting programs fill these voids?

13. What assistance is provided to ensure that each locality has reliable estimates of the extent of each problem that concerns it?

14. Have the latest research results and findings been used to estimate the extent of each problem? What procedures are followed to ensure that this research is being used?

Presentation of results needs to focus on the extent of conservation problems

As described above, the use of models may require a large amount of information to estimate problems. In general, much of this information will not be used by decisionmakers, and should be omitted to avoid confusion and to ensure a clear presentation of soil and water conservation problems and needs.

An example may help to clarify this last point. Soil erosion is one of the main problems of soil and water conservation. Its problem statements are likely to include an estimate of soil loss for different regions and localities. We would expect that the allocation of funds would be based to some extent on the significance of the soil loss in each region or locality, and that an allocation based only on the amount of soil loss would incorrectly overlook the underlying causes of the erosion. In some places, the dominant reason for the soil loss may be due to a poor choice of crop rotation and tillage practices, whereas in other places it may be that the slope is too large. The strategy to deal with each problem would be vastly different, perhaps with the former requiring minimal technical assistance to change the crop rotation, and the latter requiring substantial resources in the form of cost-sharing, loan, and technical assistance to construct a terrace. In other words, some understanding of the underlying causes of the problems is required to determine where and how many resources need to be applied. This information must be provided in some form to all decisionmakers, with the amount of detail based on the level of the decisionmaker.

In general, material presented to decisionmakers who have to determine where and how many resources need to be applied should attempt to answer the following questions.

15. What is the current extent of each problem? (The questions in appendix III may help to identify what information is necessary to characterize the extent of specific conservation problems.)

16. What is the expected extent of each problem, based on current and foreseeable trends?

17. Does each county or local office have information on the extent of the problems with which it must be concerned, or are procedures available to each county for making estimates?

18. Using the criteria for ascertaining when a particular mechanism is required, what is the need for each program delivery mechanism? (See question 3 above.) (The questions in appendix II may provide further guidance in characterizing this need; many of the questions are designed to establish the need for each individual program.)

19. Based on the underlying causes of the conservation problems, what is the estimated number of units of each practice required to solve the problems?

20. What is each estimate's accuracy, reliability, and sensitivity to changes in the variables used for prediction?

21. What part of each problem falls within USDA's responsibility?

Procedures are needed to incorporate objectives into the budget process

The main reason for precisely stating the extent of conservation problems is to provide the basis for explicitly stating, in budget justifications, the estimates of what each program and its activities are expected to accomplish in solving conservation problems. These estimates, which are intended to give the expected levels of program performance at a given funding level, will constitute each program's objectives.

Expected levels of program performance should be included in the budget request justification submitted at every stage in the development of the budget, from the local level up to OMB, the President, and the Congress (as shown in figures 1 and 2 of the preceding chapter). To put these expected performance levels (or objectives) into context, they should be arrayed alongside the extent of the conservation problems that are being solved. Since each organizational entity is now required to submit information on several alternative funding levels under the zero-based budgeting (ZBB) process, expected levels of performance should be stated for each funding level. Under current ZBB procedures, the extent to which conservation problems will be resolved is not presented. With statements of program objectives corresponding to each alternative funding level, decisionmakers can thus base their selection of an alternative on expected accomplishments rather than on funding levels alone.

Budget requests do not now indicate what conservation problems will be solved

The budget process essentially begins at the lowest decisionmaking unit within each agency (usually the field office for SCS, the district office for FS, and the county office for ASCS, FmHA, and SEA-E), where an estimate of resource needs is prepared for the next year. The estimates of resource needs are based on activity indicators associated with the programs and thus represent the local office's judgment about what level of activity can be supported at a given level of funding. However, these activity indicators do not adequately reflect (a) the purposes of the programs, (b) the extent to which the programs are expected to resolve conservation problems and needs, and (c) the extent to which some program or conservation objective is expected to be met. If indicators are to be used to measure progress, they must relate to each purpose.

For example, in the technical assistance portion of the Conservation Operations Program, one activity indicator is the number of individuals assisted. This indicator would be useful only if (1) it is broken down into distinct types of technical assistance, (2) the number of individuals needing each type of assistance is known or can be estimated, (3) it can be related to the conservation problems or needs that would be resolved with the assistance, and (4) the extent of the conservation problems or needs in the locality is known. These factors may be considered already in determining the activity levels used for estimating resource needs; however, for the most part, explicit procedures which relate these factors to resource needs are not available or used. Without

such procedures, it will not be possible to estimate realistically what each program can be expected to accomplish. Without such information at the local level, decisionmakers at higher levels will never be able to select funding levels based on what conservation problems can be expected to be solved.

Information on program capability is needed to determine what programs can be expected to accomplish

In order to estimate what a program can be expected to accomplish, we must know how much of the problem can be affected by a program at a given level of funding. (Guidelines for determining program effectiveness are presented in chapters 4 and 5.) Without data on program effectiveness, an objective is little more than wishful thinking and may be impossible to reach for any of several reasons. An objective, not tied to the conservation problems which the program will actually affect, may be unrealistic because (a) its attainment would require expenditures far in excess of likely funding; (b) the program, as designed in legislation, may not actually be capable of achieving the objective; or (c) even though the program is designed to meet the objective, it may not be implemented in accordance with the legislative intent. For example, it may be inappropriate to use a soil and water conservation program to achieve rural economic development objectives because expenditures on conservation will never be large enough to produce more than a small impact on the rural economy (although lack of conservation may have a severe detrimental effect on a rural economy).

At present, objectives, if expressed at all, are stated without knowing whether existing programs are even partially capable of achieving such objectives. However, the status of conservation problems can conceivably be used as a criterion to judge whether a program is effective. Several years' experience in relating the extent of a problem to funding levels may provide an approximation to a program's effectiveness. In general, this method for determining program effectiveness will not be too accurate, since it is often difficult to detect a change in conservation problems from year to year. However, if sufficient historical data are available, this method may prove useful. On the other hand, this method may not be acceptable for setting future objectives in a ZBB setting.

Information deficiencies must be overcome before meaningful objectives can be stated

The lack of information about the relative effectiveness of programs and the extent of conservation problems and needs in a locality make it impossible for the local offices to determine the extent to which conservation problems will be solved at each alternative funding level. For the most part, these information gaps cannot be filled by the actions of the local office alone. To close the gaps requires a concerted effort at the national level to develop procedures for using locally available information. For example, a national study could be designed to determine the characteristics of farms and farmers who need technical assistance, cost-sharing, loans, or education. The results of such a study could then be applied against known characteristics of farms within a locality to estimate the needs for these various forms of assistance.

Since the national level has more extensive resources for developing methodology and gathering data, it is incumbent upon USDA and the national office of each agency to see that this expertise is provided to and used by the State and local offices. In a limited way this is being done now for the current budget process, but, as noted above, it provides very little information on what each program can be expected to accomplish in terms of solving conservation problems. It is necessary to develop procedures for local and State offices to incorporate into budget justifications information on program effectiveness, conservation problem extent, and expected performance levels. These requirements can be summarized by the following questions.

22. With respect to current and proposed funding levels for individual USDA programs, what are the objectives for each soil and water conservation problem for each county and State and for the Nation?

23. How much of each objective will each program attain; i.e., what is the relative contribution of each program toward resolving conservation problems?

24. Are quantitative objectives (how much each problem will be resolved) set in each county and State and for the Nation?

Allocation decisions can be improved by explicit statements of objectives

We believe that the basis for selecting the funding level of a program will be improved if information on the expected extent to which conservation problems will be solved is included in budget justifications. With explicit statements of objectives, decisionmakers may find that individual programs are not emphasizing the solution of particular problems they believe are the most important. In other words, decisionmakers at every level, including the farmer county committees who develop plans for the Agricultural Conservation Program (ACP), may rank the problems in a way that would change their selection of program emphasis.

We expect that this information on program objectives will provide an opportunity to develop new procedures for allocating program funds. In general, we believe that the selection by any decisionmaker of a funding level for a program should be based on the following information (to the extent that it is available):

--an assessment of conservation problems and needs (whether at the local, State, or national level),

--a ranking of the relative importance of each problem by the decisionmakers, and

--an assessment of the relative effectiveness of different methods available under the program for solving the problems.

In considering this information for selecting a funding level; i.e., in preparing a budget request, the decisionmaker may be required to follow certain guidelines and operate within particular budgetary constraints. However, if the information on problems and effectiveness is available in quantitative form, in principle it is possible to arrange the activities of a program or a set of programs to maximize the net social value of the programs at a given funding level. On the other hand, since this information is generally not quantified, decisionmakers usually must rely on subjective judgments about these items of information and apply their own criteria for selecting a funding level and allocating program funds.

Lack of information and other constraints may present difficulties in allocating program funds

Currently, allocations to each problem and to each program are not based on quantitative objectives established

from information about the relative effectiveness of each program and the relative importance of each problem. To develop objectives that will maximize the net social value from these allocations, certain difficulties with current allocation procedures must be overcome.

In developing estimates of resource needs, the local offices of each agency are concerned primarily with their own programs. Some consideration is given to the resource requirements that will arise from programs of other USDA and non-USDA agencies, but there are presently no mechanisms for allocating funds for all USDA and non-USDA programs at the local level. Although it is desirable to consider simultaneously all programs with similar purposes, pragmatic considerations necessitate limiting attention to only the conservation programs within USDA. However, in doing this, it must be determined what share of each problem falls within USDA's responsibility, so that objectives developed for USDA can be assessed against the appropriate base. Even if only USDA programs are involved, there should be a joint decision-making process with all local agencies involved in determining how much should be allocated to each program. At the present time, local offices provide very little input which can influence the amount they receive; historical funding levels and budgetary constraints imposed at the national level tend to predominate.

The local office of an agency may even have limited discretion in the operation of a single program. If a program has several options as to how its funds can be expended, it is unlikely that allocations among the options will be based on maximizing net social value. Instead, the tendency is to distribute funds among many of the options, perhaps in accordance with some broadly worded guidance, such as "to insure technical quality" or "to meet high priority conservation and pollution-abatement needs." This approach precludes a focus on single problems. If a conservation problem is judged by the local community to be of overriding importance and it can be dealt with effectively by one option under a program, the procedures for allocating funds might be too rigid to permit that program to focus most of its resources on resolving that one problem.

To a large extent, the decision on how much money is distributed to a county or other local organization by the State offices of USDA agencies should be based on the same factors that are used at the local level. If the local offices allocate their program funds in a way designed to achieve the greatest social value, then State offices should also be able to allocate their funds in this way. In fact,

State office objectives should be based on the principle of maximizing net social values at the local level.

Like the county office, the State office is constrained by the amount of funds it receives for each program. One State might be able to demonstrate a greater return per dollar in terms of net social value than another State and thus should receive greater funding, but the former State has no control on what it receives. The State office also has no ability to allocate funds among all soil and water conservation programs. If, within a given State, one program can provide a greater return per dollar in terms of net social value than another program, so that there should be no funding to the State for the latter program, the State is unable to divert the funds to the program in which the greater returns would be achieved.

In theory, the decisionmaking process at the national level should proceed in a way similar to that which should be used in the State offices. The allocations to the States should be determined by the same factors (i.e. social value) which should be used by the States in their allocations to counties. Since the national office will know, from the State office budget requests, what each State expects to accomplish with the funds distributed by the national office, USDA should then be in a position to establish the national objectives for each program. This should be the allocation to each State that will achieve the greatest overall net social value.

The process detailed above will assure only that the funds for each program are allocated so as to achieve the greatest social value. It does not assure that the allocation among the programs will achieve the greatest net social value. At present, it is unlikely that the allocation of funds even within a single agency with more than one program is made with a view to maximizing overall net social value, but is rather based on historical funding patterns for each program. Thus, USDA needs to demonstrate that its allocation of funds to the various programs takes into account (1) the relative effectiveness of each delivery mechanism (regardless of program and agency boundaries) and (2) the relative importance of all soil and water conservation problems and needs.

USDA as a whole may also be constrained by OMB and the Congress from allocating funds in a way designed to maximize net benefits. By stating objectives in terms of solving conservation problems, the necessity for different allocation procedures may become evident.

Procedures for incorporating objectives can begin by formalizing existing decisionmaking rationales

The incorporation of program objectives into budget justifications is expected to be a long and slow process, so that it probably will be some time before there is much reliance on program objectives as a significant determinant of the funding level for each of the programs. To facilitate incorporating the necessary information into the budget processes at all levels, it would seem worthwhile first to ascertain and delineate the criteria now being used to allocate funds by the local, State, and national offices and by OMB and the Congress.

As a first step toward improving the decisionmaking processes at the local level, the local office should be required to report the rationale used to allocate program funds among the various activities permitted by the program. This rationale should include a description of the factors considered and the weight given to each factor. In assessing these rationales, it should be remembered that the primary factors are soil and water conservation problems and the need for a particular program delivery mechanism. The rationale should also attempt to show that the allocation of program funds is designed to achieve the greatest net social value.

The State office should also be required to document the procedures it uses to allocate funds to the counties. The State rationale should delineate the factors considered and the weight given to each factor and should also attempt to show that the allocation of program funds is designed to achieve the greatest net social value. In general, the allocation should not be based on the percentage of total problems in each county or the location of the most serious problem, but rather on the places where the programs will bring about the greatest net social value. Since the State office will know, from the local office rationales, what each county expects to accomplish with the funds it receives from the State, it should then be possible to establish the State-level objectives for each program. These objectives should be based on an allocation to each county which will achieve the greatest net social value. Since, to the extent possible, the allocation decisions made at the State level should be based on the rationales provided by the local offices, the State criteria should reflect the rationales provided by the local offices.

The national office should also be required to document the procedures used to allocate funds for each program to the States. This description of the national-level decisionmaking process should delineate the factors considered

and the weight given to each factor, and it should also attempt to show that the allocation of program funds is designed to achieve the greatest net benefits.

The process described in this section is designed to result in establishing USDA's soil and water conservation objectives. At each level--local, State, and national--these objectives are based on (1) a relative ranking of the importance of the various conservation problems and (2) a presumed funding level, as well as problem extent and program effectiveness. After USDA has established its objectives, the budgetsetting process continues through OMB, the White House, and finally the Congress. Any of these decisionmaking bodies may change the relative ranking or the funding level (and hence, the objectives) of the conservation programs. As with the processes within USDA, these final decisionmaking bodies need to know the rationales used in determining the levels, including all the factors considered and the weight given to each factor. With this information, the final decisions can be made as to the objectives for each program and for all programs combined.

In analyzing the rationales prepared at each level, the following questions identify the major issues that should be addressed:

25. What procedures, criteria, or other factors are now used in each county for allocating program funds?

26. To what extent do local authorities now use information on the extent of conservation problems within their jurisdictions as the basis for allocating funds?

27. To what extent do local authorities now use information about the impact of conservation practices and programs on the status or resolution of conservation problems as the basis for allocating funds?

28. What procedures are used by local, State, and national offices to rank the relative importance of conservation problems?

29. To what extent are State and county rationales in allocating funds documented and analyzed by the national office?

30. What allocation formulas and factors are now used nationally and in each State for distributing funds to conservation problems or programs?

31. To what extent should the allocation among all soil and water conservation programs be made at the local or State level, rather than, as now, at the national level?

CHAPTER 4

EVALUATION OF USDA SOIL AND WATER CONSERVATION PROGRAMS

The executive and the legislative branches eventually decide the relative seriousness of soil and water conservation problems and the best way to solve those problems when Federal funds are obligated and expended on a program. Many factors are considered during the process that leads to this decision, but the decision is based largely on piecemeal and anecdotal information about program value. The primary purpose of program evaluation is to change this situation, not by making the decision, but by providing decisionmakers with meaningful information on past program accomplishments.

The third component of the evaluation framework shown in figure 3, chapter 2 identifies the major steps that should be included in evaluating the 18 USDA soil and water conservation action programs shown in table 1. Since each program is a distinct method for assisting or promoting the installation or implementation of soil and water conservation practices (see table 4), evaluation of the programs should emphasize evaluating the method each program uses to induce installation of practices. However, since each program ultimately achieves its objectives through the installation of practices, evaluation of the programs must eventually involve evaluation of the practices. (Desirable features of practice evaluation are discussed in the next chapter.)

Program evaluation is concerned primarily with appraising the manner and extent to which programs achieve their stated objectives and perform as expected. Evaluation examines what programs have accomplished in order to assist future policy and management decisions. As a result, information developed during any evaluation should be judged for its possible uses in decisionmaking.

Evaluation of soil and water conservation programs should determine (1) what changes in conservation problems (as identified from program purposes and objectives) have been accomplished by each program and (2) any additional effects of the program. (Such changes constitute the impact of the program.) Evaluation should also determine the cost of making the changes. With accurate information on the impact and cost of each program, the evaluation could go further to examine whether the program's net social value is as much as can be expected at the given funding level. All this information can then be used to justify the continuance of the program.

Guidelines and questions presented in this chapter identify information we believe is relevant to an evaluation of USDA's conservation programs. We recognize that many difficulties will arise in developing and providing much of this information. The potential reliability, accuracy, completeness, and usefulness of each item of information will have to be determined. Nonetheless, if the value of these programs is to be demonstrated, we believe that USDA must develop and provide as much as possible of the information we have identified.

We developed guidelines that are generally applicable to all programs. However, since each program is unique, we also constructed questions specific to each program (see appendix II). In any event, the applicability of any question, either in this chapter or in the appendix, can be clarified when an actual evaluation is conducted. For example, many questions in this chapter presume that each program operates in every county. For some programs, such as the loan programs of FmHA and the watershed and flood prevention programs of SCS, such questions may not be strictly applicable and may need to be modified to capture their intent.

PROGRAM IMPACT

An evaluation of USDA's soil and water conservation programs should primarily determine what changes in the conservation problems can be attributed to the programs. These changes constitute the direct impact of the programs. Thus, an evaluation entails (1) a characterization of the activities performed under the programs, (2) a measurement or estimation of changes in the extent of conservation problems, and (3) a demonstration that the changes can reasonably be attributed to the program activities.

Programs may also have indirect effects, some of which may be unintended, but which nevertheless need to be assessed in a program evaluation. The types of indirect effects and how they should be determined are discussed in chapter 5, which deals with conservation practice evaluation.

Characterizing program activities should identify type of activity, practices installed, and initial site conditions

USDA's soil and water conservation programs deal with a large number of situations and problems, which need to be distinguished from one another in order to evaluate the various programs. One reason for making distinctions is to assess the response of USDA and the program designs in dealing with

the different situations. Another reason is the need to estimate program impact. Since the impact of most program activities is difficult to discern directly because it accrues over several years, the impact can be estimated only by characterizing the situations--i.e., from such information as the type of program activity, characteristics of the recipients, the practices installed, and the site conditions before installation. (See chapter 5 for a fuller discussion of how such estimates can be made.)

Usually, it is not appropriate to examine a program as an indivisible entity. Since there may be several distinct approaches under a single program, each approach needs to be evaluated. For example, in the ACP, a distinction must be made among long-term agreements, annual agreements, and pooling agreements. In the Conservation Operations Program, an evaluation must discern the difference between planning activities and application activities. The questions in appendix II recognize some of these distinct types of activity, but closer scrutiny of each program is necessary to identify each important class of activity so that comparisons can be made of the estimated need for each type of activity and its actual level.

Since the impact of a program or program activity is ultimately based on the impacts of the conservation practices installed or implemented under the program, it is necessary to know the number and type of practices whose installation can be attributed to each program. In some programs, particularly the education program of SEA-E and the technical assistance program of SCS, it may be difficult to determine when or if a practice has been installed as a result of the program. For evaluating these types of programs, USDA needs procedures to ascertain what practices have been installed throughout the country, whether their installation can be attributed to any program, and, if so, to which program.

To determine the impact of the practices, USDA must know or be able to estimate the site conditions before and after practice installation. In some cases, it is possible to estimate conditions after installation from information about conditions before installation and about the practice that has been installed. Information on site conditions includes physical characteristics of the land, a description of its use, and perhaps characteristics of the owner.

Much of the information specified in this section has been gathered already, although probably there remains much that has not been collected. However, little of it is used beyond the immediate occasion that brought about its development. For example, SCS, in developing farm plans, providing

technical assistance, and assessing the need for conservation practices which are to be cost-shared with ACP funds--all of which fall within its Conservation Operations Program--makes detailed assessments of site conditions to determine whether particular conservation practices should be installed or implemented. However, little or none of this information enters into any reporting system. Sampling this type of information to make it available for further use could be helpful in assessing the impact of the conservation programs.

The following questions constitute a checklist of the information required to characterize program activities:

1. What distinct activities or methods for promoting conservation are used in each program?

2. What is the need for each activity or method? How does the actual level compare to this need?

3. What number and types of practices have been installed under each program?

4. What procedures are used for determining (a) what practices have been installed throughout the country and (b) whether this installation can be attributed to a particular program?

5. What information about site conditions is required to estimate the impact of each practice? To what extent are conditions present before and after practice installation known or able to be determined or estimated for each type of practice?

Change in the status of conservation problems is the ultimate measure of program impact

A conservation program is intended to accomplish two things: (1) to solve conservation problems and (2) to overcome obstacles that deter custodians of the land from solving these problems with their own resources. (These obstacles may also be considered as conservation problems.) Assuming that the programs do work, the program impact should be measured primarily in terms of the extent to which conservation problems have been reduced or obstacles have been overcome. By monitoring the status of conservation problems, it should therefore be possible to observe in a general way whether the programs are having an effect.

However, since few programs by themselves deal with individual conservation problems, it is very difficult to

isolate the effect of single programs or program activities by monitoring the status of the problems. (Nevertheless, every attempt should be made to do so.) Moreover, it is very difficult to discern the effect of any single practice installation by a change in the status of a conservation problem. As a result, to assess practice impact (and hence program impact) it may be necessary to use surrogate variables that do not determine the overall change in a conservation problem. (See discussion in chapter 5.)

In general, impact information gained from intermediate indicators is acceptable for achieving most evaluation goals. However, it must still be ascertained whether the programs are having an effect on the levels of the conservation problems. Therefore, USDA should attempt to develop procedures for aggregating impacts of individual practices and for estimating the changes in the overall extent of conservation problems from these aggregates.

Measurement of practice impact is likely to be based on the research that led to the establishment of the practice. This research is not sufficient to determine impact with certainty under all conditions where the practice may be installed. (As a result, evaluation of practices is necessary. See chapter 5 for guidelines.) Nevertheless, research information is a sufficient base for evaluating the relative effectiveness of practices and programs, and it can be used as a tentative base for determining the combined impact of practices on the status of conservation problems.

Measurement of program impact should conform to the terms in which each conservation problem is expressed. (See the discussion in chapter 3 and the detailed questions presented in appendix III.) To the extent possible, the impact on each problem should be measured in dollar values to permit comparison of problems.

Practices are usually designed to solve specific conservation problems, and thus the character of a practice's direct impact can be identified. However, care must be exercised to ensure that important indirect and negative effects are taken into account. The impact of each program should also be separated into public and private benefits. Although these programs are not precluded from benefitting individuals or groups, either incidentally or directly, the desired distribution between public and private benefits is a matter of policy to be established by decisionmakers. Evaluation of the programs should attempt to develop such information.

The information requirements outlined in this section should be developed for each county or local office where

a program operates. This is necessary for two reasons: (a) to provide more information to enhance the capability of local decisionmakers, and (b) to provide a basis for discerning the particular conditions under which a program achieves its greatest net social value. We do not mean that each county or local office must develop sophisticated methodological and data-gathering techniques. Studies performed at the national, and sometimes the State level, should provide such techniques to local offices to help them collect and use information in the normal course of operations. Existing, or in some cases, new information systems should be designed to capture and report the desired information. Information may be combined from separate sources, such as two distinct programs within USDA or information systems maintained by other local, State, or Federal agencies outside USDA. These more immediate sources of information will not satisfy all needs; for the rest, steps must be taken to develop the necessary procedures in the future.

The following questions summarize the information requirements for program impact:

6. What is the impact of each program on the resolution of conservation problems? To what extent has each program met its objectives?

7. To what extent is the sum of the impacts of practices installed under each program an indicator of changes in the status of conservation problems? What procedures are being developed to explain differences between the two?

8. What are the indirect effects and negative impacts of each program?

9. What is the distribution between public and private benefits for each program?

10. How much program and practice impact information is available to local offices of each agency? What steps are being taken to fill any gaps?

Validity of program impact assessment depends upon the existence of cause-effect relationships

In estimating program impact, the most difficult problem is establishing that there is a cause-effect relationship between program activities and inputs and the solution of conservation problems. USDA must demonstrate that changes in the status of a conservation problem can be attributed to

program activities. In a recent GAO report, 1/ no differences were found with respect to the amount of soil lost between farmers participating in the Conservation Operations Program and those not participating. Improvements in conservation problems may be due to overall improvements in farm management rather than to installation of specific practices as a result of program activities. It is important that USDA attempt to demonstrate which forces are at work so that the best program configurations can be established for dealing with conservation problems.

Several approaches may be used to establish that there is a cause-effect relationship beween program activities and the solution of conservation programs. Whichever approach is followed, USDA should fully describe the procedures, techniques, and assumptions that have been used, with particular attention to showing how the following factors have been incorporated in the analysis:

--the possibility that a program activity might not result in the installation or implementation of a conservation practice;

--the variability of the impact of a practice with site-specific conditions (see chapter 5 for guidelines on practice evaluation);

--the variability of the impact of a practice with the level of management and maintenance of the practice during its useful life; and

--the relationship between the theoretical and the actual impact, according to how the practice is installed or implemented.

If these factors are incorporated into models which also assume that farmers will follow an optimum decisionmaking process, it is necessary to show model validity by comparing predicted effects with actual conditions.

In estimating program impacts, it is expected that USDA will develop and employ various estimating relationships. These relationships must be established using data from several locations. Once established, they can be applied

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1/"To Protect Tomorrow's Food Supply, Soil Conservation Needs Priority Attention," U.S. General Accounting Office, CED-77-30, February 14, 1977.

at the local level. Evaluation of conservation programs requires finding out how the relationships were developed and how they are being used at the local level.

The following questions summarize the concerns expressed in this section:

11. To what extent can changes in the status of a conservation problem be attributed to activities performed under USDA's conservation programs? To what extent are changes due to variables outside the control of the programs?

12. What procedures have been used to establish that there is a cause-effect relationship between program activities and inputs and the solution of conservation problems?

13. What is the percentage of cases in which an activity performed under a conservation program will lead to the installation of a conservation practice?

14. How much do site-specific conditions, practice management and maintenance, and installation variations affect the practice impact as estimated from research results?

15. If planning and prediction models have been used to establish relationships between program activities and conservation problems, what procedures have been used to validate that the predicted effects occur?

PROGRAM COSTS

An evaluation of soil and water conservation programs should identify (1) the costs attributed to the installation and operation of conservation practices and (2) who pays these costs. Program costs are tied to the installation or operation of a practice. Those who pay include (1) farmers, landowners, or groups (such as a local government) who benefit from a practice; (2) the general public through expenditures made by the Federal government; and (3) in the case of indirect costs arising from practice installation or operation, the general public pays through higher prices for consumer goods or costs to remove undesirable effects of practice installation.

Total costs must be known before deciding the Federal share

The costs of conservation practices consist of (1) installation costs; i.e., all explicit cash expenditures for

goods and services necessary to plan and install the practice, including technical services, construction costs, interest during construction, and purchases of land rights; and (2) operation, maintenance, and replacement costs necessary to maintain the physical features in sound operating condition during the economic life of the practices. Indirect effects, such as adverse economic conditions arising from installation of a practice, are much more difficult to pinpoint and, in any event, should probably be determined on an aggregate basis rather than for each practice. The determination of these costs and side effects, which are attributable to practice installation, is treated further in the next chapter.

Since many of the costs are borne by a farmer, landowner, or local government--presumably to pay for benefits which will accrue to them (generally increased revenues)--the Federal government must be aware of these private costs and benefits in order to convince the individual or group of the value of installing a practice and to determine the appropriate Federal share to pay for public benefits. Many practices result in private benefits, which in principle should not be subsidized with public funds. If private benefits are less than or equal to private costs, an individual or group may have no incentive to install a conservation practice. As a matter of policy, some inducements may be necessary to obtain public benefits. Part of the design of the programs is to provide such inducements.

On the other hand, the level of such inducements--i.e., the extent to which the conservation programs emphasize the installation of practices that have greater private benefits--is a distinct issue of policy that may vary from year to year, depending perhaps on general economic conditions. To facilitate decisionmaking on this issue, the overall private costs and benefits attributable to each program should be identified. This should be done not only nationwide, but also estimated in each county to see the variation from one county to another. With such data, it can be determined whether and where the desired emphasis of production-oriented practices, as established by policy decisions, is being followed.

In estimating these private costs and benefits, the full life cycle of the project should be considered. Although private costs and benefits vary in response to site-specific conditions, it is not likely that actual costs and benefits can be determined for each county. It is hoped that reasonable estimates can be based on cost return studies associated with each practice (see the following chapter).

Federal costs should be allocated to each program activity

One purpose of evaluating conservation programs is to show that Federal expenditures are used effectively to achieve public benefits. To assess the utility of each form of Federal assistance, all costs should be allocated to the several distinct program activities (in the same way as suggested in the previous section on program impact). Costs include (1) those expenditures that can be tied directly to the installation or implementation of a conservation practice and (2) administrative and other expenses connected with a program activity.

Costs should be determined for each distinct activity used in assessing impact. For technical assistance programs, the costs include the time actually spent in developing a farm plan, the application of a conservation practice, the certification of need in support of another program, or any other discrete activity. In cost-sharing programs, costs include the time spent in processing an application, the cost of associated technical assistance, and the amount of the cost-shares (which must include the cost of foregoing other investments--i.e. the opportunity cost--and the present value of costs that will occur in future years). For loan programs, direct costs include the time spent in processing an application, the cost of associated technical assistance, and any loan costs assumed by the Federal government.

In these three types of programs, the cost of the practice itself is not included as a Federal cost. For direct management programs, costs encompass planning and technical assistance efforts and the actual cost of practice installation and operation. In each type of program, the costs associated with any required follow-up or servicing should also be included.

Program costs that must be allocated to program activities include administrative salaries, utilities, general and administrative and similar organizational services, supporting services directly associated with the program, and office space and travel connected with the program. The costs for those activities which fail to bring about the installation or implementation of a conservation practice should also be allocated. For example, if an application is submitted for cost-sharing, but is turned down because the farm plan shows that the desired practice is not necessary, the costs associated with processing that application should be distributed among those activities that do result in the installation or implementation of a practice.

This type of cost information should be based on samples taken at the county or local office level. (Procedures for doing so should be developed at the national level to ensure that common reporting formats are used.) Analysis of these costs should then attempt to identify reasons for variations (1) by county and type of practice, (2) in ratios of allocated costs, and (3) in ratios of failures to successes in getting conservation practices installed. Analysis of these variations will provide a better understanding of how program services are delivered.

The questions that follow identify the main issues that should be examined in the cost analysis phase of the evaluation:

16. What are the total costs of installing each practice? How do these costs vary from county to county?

17. What are the costs associated with the negative effects of installing the various practices?

18. What are the private and public costs of installing each practice?

19. To what extent do private benefits exceed private costs? To what extent are public costs used to provide private benefits?

20. What is the cost of each program activity? Have allocated costs been included?

21. How much do these costs vary from county to county?

PROGRAM EFFECTIVENESS

Impact and cost information about each program's activities provides the basis for examining the effectiveness of (1) the activities, (2) the individual conservation programs, and (3) USDA's overall conservation effort. If the impact of an activity has been measured in terms of benefit dollars, it can be divided by the cost of that activity to arrive at a benefit-cost ratio for that activity. If this ratio is greater than 1.0, the activity or program is producing more benefits than it costs and is deemed to be an effective use of Federal funds (although not necessarily the best use of funds). If the ratio is less than 1.0, the activity or

program is producing less benefits than it costs and may be viewed as an ineffective use of funds. 1/

Measuring impact in terms of benefit dollars is often viewed as inadequate because it is said that benefits are intangible or otherwise not capable of being accurately measured. In such cases, it may be possible and desirable to develop an index of net social value to assess program progress and the effect of alternative funding levels. In some of these cases, it might be possible to develop surrogate measures of effectiveness that can be used to compare the performance of different conservation practices, program activities, programs, counties, States, or other geographic regions. For example, tons of soil saved per dollar of Federal cost-sharing may be a useful measure of effectiveness for erosion control practices and programs.

Another possible difficulty of benefit-cost ratios or measures of effectiveness is that the impact or benefit usually accrues over a period of years. This is particularly true for soil and water conservation programs where protection of long-term capacity for satisfying food and fiber needs is a principal goal. As a result, it is frequently necessary to estimate when the benefits of these programs will arise. Discounting procedures must then be employed to eliminate the effect of time so that measures of effectiveness can be compared (although this may not be possible when benefits cannot be measured in dollars).

Despite these difficulties, benefit-cost ratios or other measures of effectiveness should be computed, where possible, for each program activity in each county or local office. Doubts about the accuracy of such indicators and reservations about where they can be used should be articulated. Although indicators of effectiveness should be used at the local level, it is expected that standardized procedures for their computation and use will be developed at the national level.

Indicators of effectiveness are potentially useful for program management

When measures of effectiveness are judged to be reasonably accurate and an adequate reflection of activity or

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1/Benefit-cost analysis is a complex subject that cannot be adequately treated in this report. For further discussion of this subject, see our report, "Better Analysis of Uncertainty Needed for Water Resource Projects," U.S. General Accounting Office, PAD-78-67, June 2, 1978.

program accomplishments, they can be used as indicators of how well the activity or program is performing and whether some management action is required. For example, if the benefit-cost ratio for a program activity, program, or even a group of practices at a local, State, or national level is less than 1.0, reasons must be found why such a low level is occurring.

It may be that the cost part of the ratio is unusually high. One reason for this might be that the implementation of practices, program activities, or programs is particularly inefficient; for example, that there is a high number of instances where program efforts do not lead to the installation of a practice. In the case of cost-sharing programs, a reason may be that the Federal share of the costs is too high in relation to the public benefits obtained.

On the other hand, the benefit part of the ratio may be unusually low. Such may be the case when the conservation problems in an area are not very serious, and thus practices, program activities, or programs applied in that area will never achieve a high benefit-cost ratio. Benefits may be low because those applying for assistance are not given priority in order of the seriousness of their conservation problems or because those who have the more serious problems are not applying for assistance. Whether costs are high or benefits are low, management should examine each instance where the benefit-cost ratio is less than 1.0 so that the underlying causes can be identified and appropriate action taken.

The fact that a benefit-cost ratio is greater than 1.0 does not mean that the problems mentioned above are absent. In many situations (i.e., practices, program activities, programs, local offices, State offices) the measures of effectiveness are higher than those for other situations. These high-achievement situations should be studied to determine the management practices that yield greater effectiveness. Comparing different situations to find out why their ratios vary is likely to uncover many of the same reasons mentioned above. This type of analysis need not be limited to the benefit-cost ratios. Comparisons based on the elements that make up benefits and costs are also likely to reveal places where management attention is required.

If accurate and meaningful benefit and cost information is not available, worthwhile analyses can still be performed. Other indicators or measures of effectiveness can be used to make comparisons. For example, if the effectiveness of a practice is measured in terms of tons of soil saved per dollar, it is possible to compare practices to identify which

are the most effective and where the greatest effectiveness is achieved. Comparative analysis of this type might lead to more specific criteria of whether and where a practice should be installed.

In general, benefit-cost ratios and other measures of effectiveness can be used (1) to identify where good and bad management practices are present, and (2) to develop procedures and criteria for improving management. In this way, it should be possible to improve the efficiency and economy of operating local, State, and national offices and of implementing practices, program activities, and programs.

Indicators of effectiveness can be used to assess allocation of funds

Although there may be many political or intangible reasons for allocating funds (and these should be explicitly stated), USDA needs to assess the effects of the rationales upon which allocations are made from the national to the State level, from the State to the local level, and from the local level to the recipient. This is necessary so that, where legislative constraints or administrative regulations preclude the attainment of greater benefits, evaluation results can clearly demonstrate where improvements are possible. Benefit-cost ratios and other measures of effectiveness can be used in assessing these allocation procedures.

Indicators of effectiveness can identify where more conservation problems can be solved by the practices that are installed

A benefit-cost ratio greater than 1.0 does not ensure that a program is achieving the highest net social value or is having the greatest impact on resolving conservation problems. As mentioned above, improvements in management might be warranted, regardless of the value of a benefit-cost ratio or other measure of effectiveness. In addition, these indicators can be used to justify a reallocation of funds. Places with higher effectiveness might receive more funds than places with lower values. Although a reallocation should result in greater overall net social value for a program (and perhaps should be followed in the absence of any further information), it does not take advantage of other information that should be considered in allocating funds.

Another way to determine how well funds are being allocated is to identify places with serious conservation problems and then to determine if a change in allocations would result in greater net social value. Such an analysis

may be quite complex and may require the use of predictive models, but it also takes into account the seriousness of a conservation problem. To perform this type of analysis, the following information is required:

a) a description of the nature and location of conservation problems,

b) an identification of the practices necessary to solve those problems,

c) an estimate of the net social value to be gained from installing those practices, and

d) an estimate of the costs of getting those practices installed.

From (c) and (d), the estimated net social value of installing practices can be determined.

The practices are next arranged in order of decreasing net social value. Using the actual program funding level (to a local or State office), it is then possible to identify those practices, starting from the top, which could have been funded and then to compute the overall net social value that could have been obtained at that level of funding. If the potential net social value is higher than the actual net social value being achieved in the area, it is then possible to conclude that the local or State office could have obtained greater benefits at the given level of funding.

This type of analysis involves many difficulties; however, not all difficulties must be overcome before it can be used. For example, conservation problems would have to be described in sufficient detail to identify what practice should be installed, but a definitive description of all problems is not required. A sample of the conditions at particular places can be used as long as there is sufficient information to make this practice determination for each sample point, as in USDA's recent erosion inventory. In identifying the necessary practice, several feasible alternatives may have to be compared on the basis of farm budget considerations before a practice can be selected. Although an estimate of total expected net social value from the practice is desirable, other measures of effectiveness (such as tons of soil saved) can be used. If there are several types of benefits to be considered, it may be necessary to weight their relative importance. In estimating costs, it may be necessary

to predict the likelihood that the program under investigation can provide the necessary inducements to the farmer, landowner, or other recipient. Such a prediction may also involve an analysis of farm budget considerations.

Indicators of effectiveness can be used to make more effective allocations to local and State offices

The preceding analysis is concerned primarily with assessing whether the net social value attainable by a single program at a specified level of funding to a local or State office can be improved by installing practices different from those currently installed. That analysis can be extended to determine whether a program can be made more effective by different allocations of the available funds to the local and State offices.

In the previous section, we suggested that a reallocation could be based on increasing funds to places that obtain a higher net social value. If it is possible to identify practices whose installation can lead to higher net social value at a given level of funding, it will then also be possible to determine if greater net social value can be achieved with different allocations to the local and State offices. This can be done by (1) varying the funding allocations, (2) identifying the set of practices that would be installed at the new funding levels, and (3) determining the resultant change in the combined net social value. This result can then be compared to the actual net social value to determine the overall efficiency of the current allocation.

However, to this point, the analysis is based only on the effectiveness of the practice, and does not consider the variations in program efficiency at the State and local levels. If one office is highly efficient, it can achieve a greater percentage of its potential impact than an office that is less efficient. If the efficiency of an office is known, it should be multiplied by its potential net social value to arrive at an estimate of what the office is likely to achieve. This will give a more realistic assessment of a program's total efficiency. If an efficiency estimate is used to develop different funding allocations, it may have the seemingly paradoxical result of not allocating funds to the locations with the most severe problems. However, unless management improvements can be made, allocating funds in this manner seems appropriate, since a greater allocation to an inefficient office would be a waste of money.

It is worthwhile to examine an evaluation conducted by SCS, which used procedures similar to those outlined in this section. SCS's study 1/ differed from what we have suggested here primarily in assuming that the costs and the impact of a practice, measured in tons of soil saved, were the same wherever it was applied--i.e., that the conditions and effects of each practice installation were the same. Even with this assumption, the study showed that the tons of soil saved could be almost doubled if practices were optimized at a given funding level. Further soil savings, although much smaller, were also shown to be achievable with different allocations to the States. No attempt was made to consider allocations to counties within States or the degree of efficiency at which the various States were operating.

Assessment of program effectiveness depends on relative importance of conservation problems

The assessments of program effectiveness described in this section depend heavily on the relative importance assigned to each conservation problem. (We discussed the importance of ranking the seriousness of conservation problems in chapter 4 in the section on program objectives.) If each problem could be measured in the same units of value, say dollars, this would be a direct measure of the relative importance of achieving particular objectives. However, since it is unlikely that an acceptable valuation has been developed for all conservation problems, the importance of each problem must be established by assigning a weighting factor, which shows, for example, the weight given to reducing the amount of soil erosion by one ton per acre or to providing an additional visitor-day of recreation.

Since different interest groups will have varying opinions on these weights, assessments of the dollar value of each conservation objective should be made to the extent possible in order to reduce the reliance on opinion. Such assessments, however, are not likely to establish a precise value for any objective. At best they can provide a range of values. Therefore, to examine how effectively a program allocates funds to different practices and to State and local offices, it is useful to vary the weights over their expected range. Varying the weights tests the sensitivity of the assessments to the weights.

1/"A Program Evaluation of the Great Plains Conservation Program," U.S. Department of Agriculture, Soil Conservation Service, May 1974.

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In summary, it appears that the procedures described in this section can help allocate program funds. However, it is likely that the use of these or similar procedures will occur only after several years of experience, particularly since early attempts to incorporate all relevant information will be somewhat inexact. For example, if allocation decisions were based only on the expected reduction in soil erosion, opponents would argue that other benefits and other practices were not being given their proper importance. Nonetheless, it is important that formal allocation procedures be established and used insofar as is possible. In the early stages, the procedures will provide little more than general guidance; however, their use will generate specific criticisms that can assist in their fuller articulation and greater reliability.

The following questions summarize the major issues concerning program effectiveness:

22. What are the values of the measures of effectiveness (benefit-cost ratios or others) for each program or program activity in each county and State?

23. What is the variation in these indicators from county to county and from State to State? What are the reasons for this variation? What management improvements have been made in response to this variation?

24. To what extent do local offices use their resources to maximize the resolution of conservation problems? What is the potential in each county for increasing net social value achieved with their resources?

25. To what extent have each program's resources been optimally allocated? Could greater net social value have been achieved by each program under different allocations to local or State offices (as measured against a single objective or against multiple objectives with a ranking of the relative importance of each objective)?

26. What is the sensitivity of the results to different rankings of the relative importance of the conservation objectives?

PROGRAM NECESSITY

In the preceding section guidelines were laid out for assessing and perhaps improving the effectiveness of each program. However, the discussion was presented as if each program were the only means for achieving soil and water conservation objectives. This is not the case. To some extent, the various programs are alternative methods for achieving similar objectives, with different levels of effectiveness in each county and State depending on physical conditions, conservation problems, management efficiency, and several other factors. As a result, some programs, by using funds more efficiently, may be preferred to other programs.

Allocation of funds to each program needs to be assessed

In evaluating its soil and water conservation programs, USDA should try to justify that the expenditure of funds under each program in each local area is the most effective use of those funds. If this cannot be done for a substantial number of local offices, the necessity for the program should be called into question. In addition to justifying the existence of each program, USDA should also attempt to demonstrate that the allocation of funds to the various programs will result in the greatest possible net social value. One way of doing this is by extending the procedures for assessing the allocation of a single program's funds to local and State offices.

Assessment may demonstrate that a program is not needed

In the preceding section, the procedure for assessing the allocation of a single program's funds to each State or local office consisted of varying the funding allocations to an area, identifying the practices that would be installed at the new funding levels, and determining the resultant change in net social value.

This same procedure can be used to determine if greater net social value could be achieved if the funding constraint on each program is removed and the funding levels of the various programs are allowed to fluctuate within a funding constraint for all conservation programs combined. The result of varying the funding level for each program would be to recompute the allocations to State and local offices and the practices that would be installed under each program. This approach has the advantage of redistributing funds among the programs, rather than determining the potential net social

value on a program-by-program basis. Using this approach, it is quite possible that the procedure will lead to no funding for a particular program because the installation of practices under that program would constitute an ineffective use of funds. This does not necessarily mean that the particular program is inefficient or ineffective, but only that there is a more effective program for the area. This situation can arise because the conservation problems or the delivery mechanisms needs of a particular area do not mesh with what a program is capable of accomplishing.

In principle this procedure approximately equalizes the marginal net social value of all programs in a local area. To ensure that this can be done, it is necessary to use consistent methods in creating an information base for all programs. Thus, the ranking or weighting of the relative importance of the several conservation problems must be the same for each program. This is why, as noted in chapter 3, there should be a joint decisionmaking process in each locality by all USDA conservation agencies to rank the relative importance of each problem.

Since this procedure also requires identifying the practices that could feasibly be installed or implemented to deal with particular conservation problems, it is preferable to develop a single list of feasible practices, rather than providing a list for each program. The impact, installation cost, and other implications of each practice will be the same regardless of which program brings about its installation. As the Federal cost will vary from program to program, it is necessary to determine which program can bring about the installation of a practice for the lowest cost. In some cases, several programs would be involved.

To arrive at the best strategy for getting a practice installed, the likelihood that the recipient will be induced to install the practice by the assistance provided under each program must be determined. If inducements from several programs are used simultaneously, this likelihood will increase, but the Federal cost will also increase. If the expected benefits are low, the additional cost may not be worthwhile. For example, if the expected impact from installing a practice is relatively low, it may be better to try only an education program, with no technical assistance, cost-sharing, or loans. Thus, the more expensive programs may be saved for those practices whose expected impact is much greater.

It is important to understand how to predict the likelihood of a successful installation. The success rate may correlate with the type of practice, farm type, farm size, crop type, or other factors. Understanding these relationships

may lead to different strategies to obtain installation or implementation of various practices. Studies can be designed to test various methods for improving the success rate; for example, rather than maintaining all existing voluntary programs, it may be desirable to ascertain where the greatest success can be achieved and to target program efforts to solicit participation.

Programs that satisfy unique conservation needs are not automatically justified

The preceding description of a multiprogram, multiobjective procedure for analyzing soil and water conservation problems is confined to those programs that are alternative methods of achieving the same conservation objective. Thus, this procedure can be used to demonstrate that each program is justified as a part of the total approach for dealing with conservation problems. However, some aspects of a program may be unique in that they deal with a distinct problem not adequately covered in a comparative evaluation. In this case, it may be necessary to justify such programs individually. An individual analysis may also be required where insufficient information is available for a satisfactory multiprogram, comparative analysis.

It should be recognized that a program-by-program evaluation cannot judge the relative importance of each program unless USDA assesses the relative value of achieving the distinct purposes for which the program is designed. With this in mind, the justification for each program, considered by itself, can conceivably be based only on whether the program achieves a positive net social value. However, this criterion is not totally satisfactory when greater net social value could be achieved by other programs. In such cases, the funds for programs dealing with unique problems could be used to greater effect by being shifted to these other programs. Nonetheless, a program dealing with unique problems may still be funded in such circumstances when policymakers feel that the intangible and unquantified value of the program is sufficient to bring it up to the level of the other programs.

Other alternatives to existing programs must be considered

In general, each of USDA's action programs is designed to deal with distinct factors that may deter individuals or groups from installing conservation practices. Such factors include insufficient benefits to users, installation and maintenance costs, lack of technical knowledge, effect on the

efficiency of operations, inadequate user education, user apathy, and the capability of the practice itself. Given such problems, the principal evaluation issue for each program is whether these obstacles deterring practice installation are indeed being overcome. (This issue must be more definitively elaborated in view of the specific design of each program; some such program-specific questions are detailed in appendix II.)

Even if each conservation program is justified on its own merits or as a part of the total configuration of programs, it is still not certain that these programs are necessary or the best use of Federal funds to overcome obstacles deterring practice installation. Several other methods may be viable alternatives to existing programs. State and local programs and regulatory programs are two examples of well-defined alternatives. It may also be possible to use more private sector activities to accomplish some objectives that yield substantial private benefits from the installation or implementation of practices. Private irrigation consulting firms, for example, provide irrigation scheduling. Usually such services have beneficial public effects as well. (In this case, the benefit is more efficient use of water with less erosion due to over irrigation.) Tax policy, such as income tax credits for construction or implementation of conservation practices, may also have conservation benefits. Another possible alternative, involving no direct Federal assistance, is based on the thesis that, as farmers and landowners become more efficient managers of the resources under their control, they simultaneously achieve many conservation objectives.

Each of the methods mentioned has been used, even though in some cases without a conservation orientation. USDA needs to examine these methods and assess their value as part of a total strategy for achieving conservation objectives.

The following questions summarize the major issues with respect to program necessity:

27. What is each program's relative effectiveness in achieving objectives? Does program effectiveness vary by county? If so, have the conditions (such as farm type and size, land class, geographic region) been identified under which each program achieves its greatest effectiveness?

28. How much has the effectiveness of each program been considered in determining the funds allocated to it?

29. To what extent has each program used the same methods for ranking the relative importance of conservation problems and for assessing the impact and cost of each practice?

30. What procedures are used to determine the best program combination for getting a practice installed?

31. How does the effectiveness of programs dealing with unique conservation problems compare with that of other programs? If the effectiveness of these programs is lower, what intangible and unquantified benefits justify their use?

32. How does the effectiveness of USDA programs in achieving conservation objectives compare with the possible effectiveness of other methods, such as State and local programs, private sector activities, tax expenditures, and regulatory programs?

33. To what extent do technological changes, rather than Federal program intervention, achieve conservation objectives by improving farm management or farming operations?

CHAPTER 5

EVALUATION OF SOIL AND WATER CONSERVATION PRACTICES

Evaluation of soil and water conservation programs must ultimately be based on the conservation practices that are installed or implemented as a result of the program. Most of these practices can be installed or implemented under any USDA program; therefore, evaluating any practice as installed--i.e., determining its impact, cost, effectiveness, and necessity--is essentially independent of the program under which it is installed or implemented. This chapter presents general guidelines for evaluating any practice. However, to provide the information specified by the guidelines, USDA may need to use specialized experience in order to collect the relevant research findings that bear upon such an evaluation.

Most of USDA's conservation practices are described in the National Handbook of Conservation Practices (NHCP) 1/ We list them in table 4, chapter 2. (Since this handbook is intended for use primarily in the SCS Conservation Operations Program, each of the other action programs should be examined to determine if there are any practices not covered in the handbook.) The NHCP presents a definition, a purpose, requisite conditions, and specifications for each practice. This information is a satisfactory starting point for evaluating each practice. It might be possible to extend the handbook by adding procedures for local and State offices to evaluate each practice.

In evaluating practices (and hence programs), USDA must understand two types of changes that occur when practices are installed or implemented. First, USDA must determine or estimate the impact of practices on conservation problems. Second, since the installation or implementation of practices affects the economics of agricultural and natural resource management systems, USDA must determine or estimate practice costs from the standpoint of individual farmers and resource managers. This knowledge of conservation impact and practice economics should then be used as the basis for policies that promote particular types of practices. Finally, this information should be used to identify problems of adopting and implementing these policies.

1/U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 1977.

PRACTICE CONSERVATION IMPACT

As mentioned in chapter 4, the impact of a conservation program is ultimately based on the combined impact of the practices installed under the program. Therefore, to determine program impacts, it is necessary to know the impacts of individual practices 1/ and to know how to combine them to determine program impact. The conservation impact of a practice is defined as the change in the extent of a conservation problem brought about by the installation of a practice. To compute or measure the change, it is necessary to know the extent of the conservation problems before and after practice installation.

We note at the outset that measuring practice impact is quite complex and in many cases perhaps not yet possible. For this reason, it would be valuable for USDA to develop or collect in one compendium a description of the procedures to be used in determining the impact of each conservation practice. These procedures should describe how to measure the impact of installed practices, based on conditions specific to the practice sites. Such procedures should be used as criteria for determining whether a practice should be installed at a particular location. The following guidelines present general concepts upon which the adequacy of the procedures can be assessed.

Practices may have an impact on several conservation problems

First, USDA must identify the conservation problems that each practice can affect. The purposes of each practice, as stated in the NHCP, provide a starting point for this task. However, this list is unlikely to be complete in several respects. Practices may be designed with particular purposes in mind, yet they may affect conservation problems other than those stated. No specific method exists for identifying all the problems that a practice can affect. USDA's Land and Water Conservation Task Force tried to identify them by asking experts for their opinions on the problems affected and the relative significance of the impact of each practice. The lists of practices and conservation problems used in this study were probably not complete, but the method seems to have some value in relating practices to problems.

1/Some practices are installed only as components of larger practice systems and hence should not be evaluated individually; the larger practice system should be evaluated as an indivisible unit.

In identifying the impact of practices, it is important to recognize that the installation of a single practice may have only a negligible effect on some problems, so that it is not worthwhile to attempt a calculation. However, if a practice is installed at several sites in an area, the combined impact may be significant and worth the effort of performing the necessary analyses. In some cases, the combined impact of several installed practices may be greater than the sum of the impacts of practices that were installed in isolation. This is why, in such cases, USDA promotes pooling agreements to ensure that the combined impact is achieved. Evaluation procedures for such practices must provide the capability for assessing their combined impact.

Procedures must consider onsite and offsite effects

The next step is to describe or develop, for each practice, the procedures to be followed in determining their effect on each conservation problem. To the extent that procedures are not already available, they should be developed in order of decreasing importance--there is no need to develop procedures for insignificant impacts. The procedures should also try to distinguish between public and private impacts; to some extent, private impacts will correspond to onsite effects and public impacts will correspond to offsite effects.

The procedure descriptions should specify the terms or indicators by which practice performance will be measured. Since the conservation impact of a practice will essentially be a change in the extent of one or more conservation problems, performance measures are likely to be the same indicators used to measure the extent of the problems. (See chapter 3.) Furthermore, the procedures for determining practice impact will be very similar to the procedures used in estimating the extent of the various problems. For example, the extent of the erosion problem, measured in terms of tons of soil moved, is estimated using the Universal Soil Loss Equation. This equation incorporates several factors, such as soil erodibility, rainfall, cropping pattern, and conservation practice pattern. To estimate the impact of a conservation practice, it is necessary to know the values for each factor before and after the practice is installed. Any impact that occurs is a result of some change in one or more of the values in the equation, brought about by the installation of the practice. In the case of soil erosion, to establish the impact of a practice, it is necessary to demonstrate that the installation of the practice will change the value of one or more of the factors.

The preceding example shows generally how the impact will be determined when the effect is a direct, onsite consequence of practice installation. For an offsite impact, many more steps may be required. For example, to determine the impact of a practice on the sediment level of a nearby stream, we would be interested, as before, in the change effected by the practice, but in this case it might be very difficult to discern any change resulting from the installation of a single practice. Determination of this impact might begin by applying the Universal Soil Loss Equation to determine the change in the amount of soil eroded, which would then have to be incorporated into a model of soil transport in order to estimate the amount of sediment delivered to the stream and the effect of this amount on the sediment level. In this example, it might be necessary to aggregate the effects occurring at several sites before a change in the predicted sediment level could be discerned. Moreover, the aggregation is more than a simple addition of effects, and may require a model to determine the aggregate contribution of many practice installations.

Procedures can be developed from research results, but they must be validated

Models that can be used to estimate onsite and offsite impacts will generally be developed under precisely controlled research conditions. In the two examples described above, research results will establish what changes occur in the underlying variables of the Universal Soil Loss Equation when a practice is installed. Given the importance of research findings for evaluating practices, it might be useful to consolidate those results pertinent to the evaluation of each practice.

To some extent, research on a particular type of impact, particularly offsite effects, may be applicable for evaluating more than one practice. For example, several practices may be designed to control soil erosion. For each practice, research on its effect in changing the variables of the Universal Soil Loss Equation would be unique for that practice, and thus would have to be consolidated separately. On the other hand, research regarding soil transport phenomena--and hence the impact of practices on sediment levels in streams--would be pertinent to several practices. This research could be synthesized separately and then incorporated by reference in the procedure descriptions for the individual practices.

Synthesis of research results should not be performed simply to provide a current description of the state of the art, but rather to help estimate the impact of practices actually being installed. Practices are applied according to site-specific conditions and their impacts must be measured in these terms. It is not sufficient simply to state that land has been adequately treated or protected; the amount of change in the variables under study must be determined.

In applying research findings, care must be taken to ensure that the procedures followed will provide accurate results for the specific conditions where the practice may be installed. Inaccuracies arising from an inability to measure all the pertinent variables in actual conditions, or from uncertainties not yet resolved by research, should be noted in procedure descriptions and in any impact assessments performed based on these descriptions. Statements about any inaccuracies will help not only in judging the impact assessments but also in identifying any deficiencies that should be the focus of future research.

At present, there are many uncertainties in measuring the impact of conservation practices. These uncertainties include (1) whether all significant impacts of a practice have been identified, (2) whether adequate procedures are available for estimating each impact accurately, (3) whether available research results permit impact estimates for all specific site conditions, and (4) whether procedures exist for aggregating the impact of several practices installed in an area. To some extent, these uncertainties may be resolved by direct research; however, additional methods for validating impact estimates would be useful. Since many of the practice impacts are interrelated, it may often be possible to make estimates in one context and direct measurements in another, and to use the measurements as a check upon the estimates. For example, the amount of soil erosion in a watershed is estimated from measurements at specific sites. Since this soil erosion affects the sediment levels in streams and reservoirs, actual measurements of sediment levels can be used to assess the validity of the soil erosion estimates. Changes in sediment levels should reflect changes in practice implementation. Several similar examples could be given for validating estimates of practice impacts. Such validation techniques should be developed to the extent possible for each practice (or group of practices, if necessary) and should be described in the procedures for assessing practice impacts.

The following questions are a checklist for assessing the adequacy of the procedures used to estimate conservation practice impact:

1. Which conservation problems are affected by each practice? Have all the positive and the negative impacts of each practice been determined? Have aggregate effects been considered in identifying practice impacts?

2. How effective is each practice or resource management system in controlling the conservation problems of the places where it is installed or implemented?

3. What is the assessment methodology used to estimate the impact of each practice?

4. For each practice, have onsite private benefits that accrue to the farmer or owner been distinguished from public benefits (or damages avoided)?

5. What indicators should be used to measure the performance of each practice?

6. What procedures are being followed to ensure that all research relevant to determining the impact of practices will be consolidated?

7. To what extent do procedures permit an estimate of practice impact under all possible site conditions? Have potential inaccuracies in procedures been identified?

8. To what extent can estimated impacts be validated? What discrepancies, if any, have any validation attempts revealed?

PRACTICE COSTS

The cost of installing conservation practices is an important element that must be included in the evaluation of practices. Practice costs, which refer to the total costs incurred in installation without regard to who pays, are important in

a) devising an optimum conservation strategy for a particular site,

b) determining where tradeoffs should be made between different strategies (e.g., removing sediment from a river or preventing erosion at the source),

c) determining the extent to which governmental financial intervention is desirable, and

d) assessing the total economic impact of conservation activities.

Practices should be analyzed within a common cost structure

It is essential to develop an accurate picture of the costs for each practice. To do this, USDA must first identify the cost structure and cost elements that should be employed for each practice. The cost structure may differ from one practice to another, but there will be sufficient similarity to permit the development of standardized structures applicable to several practices.

At a broad level, practices may be subdivided into management practices and engineering practices. Management practices generally require reapplication from year to year (although some may have a positive impact for more than a year). The cost elements for these practices generally include only direct costs for labor, machinery operation, energy, and materials, with no investment. Engineering practices generally involve a single application, which is intended to endure for several years; i.e., building a structure or substantially reshaping the land. The cost elements for these practices are the same as for management practices, except for the addition of an investment cost that is prorated over the life of the practice. Engineering practices might also involve annual operating and maintenance costs, which should be included in the cost structure.

Practice costs must include the effect on the agricultural sector of the economy

Conservation activities may be a small part of a farm's total operation, and thus easily overlooked. However, conservation may represent the difference that makes a farm uneconomical to operate. As a result, in measuring the economic impact of conservation practices, it is necessary to determine their effect on farm budgets (particularly the effect on yields, energy requirements, and water and fertilizer use). From these economic considerations, or from other factors, conservation practices may also lead to crop shifts, regional income redistributions, and changes in land use. The economic

impacts caused by the installation of conservation practices is an important factor to determine--even if only in the aggregate.

Installing conservation practices may lead to adjustments in farm cropping patterns and production activities. The costs of such adjustments will be more difficult to identify than the direct costs of installation, since any change will generally be reflected only by increases or decreases in current operations. (It should be noted that for some practices there may be no adjustments in farm activities.) The cost of changes should be determined for each operation, including tillage, fertilization, pest control, planting, harvesting, and storage and transport. For each operation, the analysis should include the costs of labor, equipment (including amortized investment and operating and maintenance costs), fuel, interest charges or opportunity costs, and materials (fertilizers, pesticides, and seeds). Such an analysis of the total farm budget provides a more complete cost assessment that can be used to determine the effect of conservation on the farm economy, from the individual farm to the entire agricultural sector.

If the installation of conservation practices leads large numbers of farmers to change their production activities, significant aggregate costs may also be associated with the practices. Depending on the location, concentration, and magnitude of changes in production activities brought about by practice installation, the prices, location (or degree of regionalization), and production levels of particular crop sectors could be significantly affected. At a more aggregate level, farm income, cropland acreage, land values, and foreign exchange earnings could also be affected. Each of these items represents a cost arising from the actual installation of a conservation practice and thus should be determined. Such aggregate economic effects are predicted by some economic models; however, these models have not been validated by experience.

Cost estimating relationships need to be developed

All the costs mentioned should be determined for practices actually installed. However, it is not likely that actual costs will be generally available, so it will be necessary to develop estimating procedures that can be used instead. Such procedures should be capable of estimating costs based on site-specific conditions; i.e., on information about the characteristics of farms where a practice is actually installed. Since many practices are installed by vendors, the direct costs for these practices may be based on

vendor charges. Further, many programs stipulate that vendor costs must be certified. In these cases, cost information can possibly be assembled from vendors to arrive at statewide or nationwide estimating relationships. These relationships may be very simple (e.g., cost/acre), or they may require an understanding of many factors before costs can be estimated.

Since the actual adjustments in farm cropping patterns and production activities will generally not be realized until after practice installation and will, in any event, be tied closely to the decisions made by individual farmers to ensure profitable operations, it is not likely that the actual costs of adjustments can be determined. Estimates of these costs must be developed using cost models of the production process. The farm budget generator currently used by USDA can be adapted to this purpose. This can be done by identifying the changes in production operations that will occur as a result of practice installation and by adjusting the parameters of the budget generator accordingly. It will not be necessary to change the budget generator itself in order to estimate the cost impact of practice installation; it will only be necessary to change the values that are entered into the generator. The budget generator can be used to help choose the cropping patterns and production activities that will maximize returns to the farmer and thus help in inducing the installation of conservation practices. Since the budget generator is an idealized model of production activities and is not expected to represent actual circumstances, the results it generates must be validated with whatever actual data may be available.

The aggregate effects, and hence the aggregate costs, of the practices actually installed should be derivable from the effects and costs on individual farms. If these aggregate effects are not significant and reflect only minor adjustments in the agricultural sector of the economy, then the summation of the changes directly identifiable on individual farms, such as shifts in cropping patterns, production levels, and land values, is likely to be reasonably accurate. However, if these aggregate effects are significant, the changes on individual farms will indirectly lead to other changes throughout the agricultural sector of the economy. To determine if these changes are significant, national economic models of the agricultural sector must be used. This can be done by aggregating the directly observable effects on individual farms and entering the changes into the models. If the changes predicted by the model for such things as crop prices, farm income, and foreign exchange earnings are not significant, i.e., are not enough to be measurable, then the aggregate effects of practice installation will consist solely of the directly observable changes on individual farms. If, on the

other hand, the changes predicted by the model are significant, and these changes can be validated as occurring (e.g., actual changes in farm prices), then the aggregate effects of practice installation consist of both the directly observable effects on individual farms and the multiplier effects throughout the economy.

The following questions summarize the requirements to be satisfied in determining practice costs:

9. What is the cost structure used for determining the costs of each practice?

10. What practices are likely to lead to significant changes in farm cropping patterns or production activities? What cost elements must be included in estimating the cost of these changes?

11. What procedures are used to estimate the direct costs attributable to practice installation?

12. What is the cost of installing or implementing each practice? How do these costs vary according to geographic region, farm type, farm size, land class, and other relevant parameters?

13. What procedures or models are used to estimate the changes in farm cropping patterns or production activities?

14. What changes in farm cropping patterns or production activities have been identified as arising from the installation of conservation practices? Have these estimates been validated?

15. What procedures or models are used to estimate the aggregate economic effects of installing practices?

16. What aggregate economic effects of installing conservation practices have been observed? Have these estimates been validated?

STRATEGIES FOR PRACTICE INSTALLATION

With impact and cost information, as described in the previous two sections, it is possible to evaluate the practices in greater depth, both individually and insofar as they combine to constitute an overall policy of conservation.

Impact and cost information is needed to provide conservation assistance

Impact and cost information should first be used to determine the value of installing conservation practices at particular locations. When used in this way, impact information should include all practice effects, whether positive or negative. If impacts cannot be expressed in dollars, other indicators should be used. Cost information should include the direct costs of installation and the costs of adjustments in cropping patterns and production activities that are attributable to individual practices. (These adjustments may lead to increased revenues rather that costs.) It is unlikely that any aggregate costs can be attributed to individual practices; in any event, it is unlikely that they would be significant for single practices.

Information on practice impacts and costs is needed, in the first instance, for planning rather than evaluation purposes. In many cases, it is likely that any of several conservation practices could be installed at a particular site. Estimating the expected impacts and costs of each alternative is desirable not only to help the farmer to make decisions, but also to determine the Federal Government's position with respect to any educational, technical, or financial assistance. Procedures should be developed to ensure that this type of planning assistance is given before any further technical or financial assistance is provided. Experience gained by providing planning assistance can be useful in developing further criteria about where and under what circumstances particular practices are likely to be successful. (It should be noted that, since planning occurs before installation, these estimates of impacts and costs may not reflect exactly what is actually installed.)

An understanding of the net social value for practices actually installed is essential to the development of any strategy to maximize the net social value at any level of of funding. (Net social value in this case may be defined roughly as conservation impact plus returns to farmer minus farmer and Federal costs.) For each practice, it is desirable to determine where and under what circumstances the greatest effectiveness is achieved. This will help to ascertain the viability of each practice by geographic location, farm characteristics, or other parameters. In particular, it is important to identify where private benefits exceed private costs--i.e., where it would be beneficial for a farmer to install a practice in the absence of any Federal assistance.

Impact and cost information is needed to help formulate policy

In addition to examining each practice individually, it is necessary to analyze the effectiveness of groups of practices. Whereas aggregate economic effects would not be distinguishable in the case of individual practices, aggregate costs are likely to be significant in analyzing groups of practices and must be included along with farmer and Federal costs.

Analyzing groups of practices has a twofold value for decisionmakers: it provides an indepth treatment of relevant considerations, and it ranks the relative importance of conservation problems. Decisions of policy are ultimately based on politics, but it is nonetheless worthwhile to foster as full an understanding of their implications as possible.

Examination of management versus structural practices

By grouping practices as predominantly management-type or structure-oriented, it will be possible to ascertain whether the management-type practices, which are sometimes viewed as more production-oriented than conservation-oriented, are more or less effective in terms of overall benefits or in terms of conservation benefits. Regardless of how this issue is resolved at the national level, it is quite conceivable that a choice between one or the other may vary (1) by region of the country, (2) for particular crop sectors, (3) for particular conservation purposes or problems, (4) by farm size, or (5) in regard to some other characteristic. Since these characteristics are likely to be relevant in estimating impacts and costs, it should be possible to compare management practices with structural practices for any desired grouping based on these characteristics.

Examination of geographic regions and crop sectors

Grouping practices by where they are installed in different regions will make it possible to determine where the greatest net social value is being achieved and whether particular regions are bearing an undue proportion of the effort for resolving conservation problems. If practices are grouped according to particular crop sectors, it can be determined which crop sectors should be emphasized because of greater net social value (perhaps because production operations in those sectors are a significant source of conservation problems). It might also be determined, for example, whether

particular crop sectors are suffering disproportionate price increases as a result of installing practices, compared with price rises in other crop sectors.

Difficulty in solving particular conservation problems

If practices are grouped according to where they have their principal impacts (e.g., water quality, habitat development, recreation, water supply, flooding, or food and fiber production), the net social value of the various groups would show the relative difficulty of achieving particular objectives. These net social values might also give rise to questions about the ranking of the relative importance of different objectives as developed for the various programs. For example, practices that emphasize habitat development may be very inefficient as indicated by low net social values, whereas other practices with different emphases may have significant incidental benefits for habitat development. In such cases, the best strategy for habitat development may be to emphasize practices with other principal objectives.

Conservation burden on farms of different size

If practices are grouped according to farm size, it might be possible to determine the extent to which conservation efforts impose a significant burden on the viability of farm operations. By examining the effectiveness of different types of practices as applied to different farm sizes, it may be found desirable and feasible to devise distinct strategies for dealing with conservation problems on farms of different sizes.

Other uses of impact and cost information

Several other issues related to soil and water conservation might profit from an analysis of the impacts and costs of particular groups of practices. For example, it might be possible to examine the extent to which the use of marginal lands and the loss of prime agricultural land are affecting the impacts and costs of dealing with conservation problems. It might also be useful to compare the effectiveness of practices on nonagricultural projects and areas. Since the effect on energy costs of adjustments in cropping patterns or production activities is determined in computing the costs associated with practice installation, it might be possible, by an appropriate grouping of practices, to devise particular strategies emphasizing lower energy use. The varying effectiveness of particular groups of practices might also lead

to the development of strategies designed to achieve particular land use objectives such as the retention of prime farmland, the shifting of crop production, the protection of wetlands, and the better use of floodplains.

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The following questions identify policy issues whose resolution can be assisted by an understanding of conservation practice effectiveness:

17. What is the net social value for each practice or resource management system? How does this value vary by State and county, farm type and size, and land class? To what is this variation attributable?

18. Under what circumstances, if any, would the private benefits to the farmer outweigh his costs (making it economically advantageous for the farmer to adopt the practice without any assistance)?

19. How do the impacts and costs of annual, management-type practices compare to the costs and benefits of the more enduring engineering practices (where they are alternatives to one another)?

20. To what extent does the attainment of conservation objectives impose undue burdens on particular geographic regions or crop sectors?

21. To what extent are there conservation problems for which adequate technical practices do not exist?

22. To what extent does attainment of conservation objectives impose undue burdens on farms of different size?

23. To what extent do the increasing use of marginal lands and the loss of prime agricultural land make it more expensive to deal with conservation problems?

24. To what extent can conservation practices contribute to reductions in energy use?

25. To what extent can conservation practices affect the retention of prime farmland, the shifting of crop production, the protection of wetlands, and the better use of floodplains?

PROBLEMS OF PRACTICE ADOPTION

The development of a comprehensive strategy for dealing with soil and water conservation problems depends on an understanding of (1) how these problems can be solved from a technical point of view and (2) what hinders the adoption of the technical solutions. USDA's research programs are intended to deal with the first question by developing practices that can solve the problems under the various conditions in which they are found. USDA's action programs are designed to deal with the second problem by removing the obstacles deterring the adoption of these technical solutions.

In chapter 3, we presented guidelines for articulating the extent of the various conservation problems. In the first section of this chapter, guidelines were presented for developing procedures to determine the impact of each practice in terms of its resolution of conservation problems. In the previous section on practice strategies, we showed how impact and cost information can be used in planning assistance to identify the most effective practice. Although this and other information can be used to configure present program mechanisms and conservation practices to optimize the return from funds allocated to soil and water conservation, this does not ensure that all conservation problems will eventually be dealt with satisfactorily. To do that, it is necessary to estimate the extent to which the present program and practice combinations can resolve conservation problems.

Practices and programs may not solve conservation problems

There are many factors that could either limit a practice from having its designed impact or prevent its installation or adoption. The USDA Land and Water Conservation Task Force studied both these effects. 1/ Each practice, assessed in several regions across the country, was rated by several experts on the extent to which its installation would solve particular conservation problems. The rating scale ranged from "practice essentially brings the problem under control" through "either no impact or an inconsequential impact from use of the practice" to "practice causes such a significant negative impact that its positive impact in controlling

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1/See "Impact and Capability of Soil and Water Conservation Practices," U.S. Department of Agriculture, Land and Water Conservation Task Force, U.S. Government Printing Office, Washington, D.C., January 1979.

another problem may not be worthwhile." In only a few cases did any practice in any location achieve an overall rating for any conservation problem higher than "practice controls problem at a level of about 50 percent." No attempt was made to ascertain why the practice impact was less than complete.

Each practice was also rated on factors that may prevent its installation. Although no absolute scale was used, each practice was rated on the following limiting factors: (1) insufficient benefits to user, (2) installation/maintenance cost, (3) lack of technical assistance, (4) production efficiency of operations, (5) user education/apathy, and (6) practice technical capability.

The factors examined by USDA may not be complete, but the study indicates that they are sufficient to create a shortfall in the ability of practices to solve problems because of either inherent limitations in the practices themselves or the possibility that the practices would not even be installed. A further understanding of these factors and the extent to which they would affect the installation of practices is needed for determining whether new delivery mechanisms or changes in existing mechanisms are warranted.

An understanding of practice and program shortfalls may be feasible

In order to understand what conservation problems are not likely to be solved by existing practices and programs, it is first necessary to estimate the need for each conservation practice--i.e., the number of units of each practice that seems to be required. This can be accomplished by using (1) the estimates of the extent of conservation problems and (2) the underlying information needed to identify which practices should be used to solve the problems, including the identity of those conservation practices currently in use. From this information, it may be possible to identify the practices best suited to solving outstanding conservation problems. Once the practices are identified, it would be possible to determine what part of the problems would be solved and what would remain unsolved. This, in turn, would enable identifying where new practices are needed.

This effort will not, however, show the full extent of any shortfall in solving conservation problems, since it assumes that the practices indicated in the optimum configuration will eventually be installed. From information about program effectiveness--i.e., the relationship between funding levels and the installation of practices--it would be possible to determine the likelihood of installing the required practices. In assessing this likelihood, the extent to which

private costs exceed private benefits (in which case installation of the practice would be unlikely) must be known. In other words, USDA should attempt to ascertain how much financial assistance would be necessary to induce the installation of tne practice without impairing the farmer's competitive position.

In summary, the following questions must be answered to determine the extent to which new practices and programs are required to solve conservation problems that cannot be solved adequately by existing practices and programs:

26. What conservation practices are now installed or being followed by the Nation's farmers? What is the status of other conditions on the Nation's farms which indicate the need for conservation practices?

27. What is the need for each practice?

28. What factors (such as costs, lack of education, lack of benefits to the user, availability of technical assistance, reduced production efficiency, and technical capability of the practice) limit the impact of each practice (i.e., prevent the practice from having its greatest impact)?

29. What factors tend to prevent the installation or adoption of each practice?

30. What would be the effect of practice installation or implementation on the farmer's competitive position based on private benefits and costs, without any government assistance? What would be the effect on the low-income farmer's competitive position?

31. What necessary conservation practices are unlikely to be installed under existing programs?

32. What conservation problems are unlikely to be solved by existing practices and programs? Where are new practices or programs needed to solve conservation problems?

APPENDIX I

United States Senate

COMMITTEE ON
AGRICULTURE AND FORESTRY
WASHINGTON, D.C. 20510

June 1, 1976

The Honorable Elmer B. Staats
Comptroller General of the
United States
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Comptroller General:

The Committee on Agriculture and Forestry is starting to plan a comprehensive review and oversight of soil and water conservation programs administered by the Department of Agriculture. We hope to hold hearings on this matter sometime next Spring. Conservation programs of the Department of Agriculture generally pertain to the areas of environmental improvement and resource development and use, and as such, may have objectives similar to programs administered by Departments other than USDA. Therefore, proper oversight of USDA conservation programs requires that they be evaluated with respect to their contribution to improving the environment and developing and using our natural resources.

Further, both the agricultural and forestry communities are being required by the courts, and by legislation, to take major steps to avoid practices which might cause environmental degradation. Some of these environmental requirements are likely to have a costly effect on food and fiber production. Are present programs adaptable to these changes?

The complexity of our planned oversight efforts requires that they focus on the major issues that need to be considered by the Committee. Recent discussions between the Committee staff and members of your Office of Program Analysis and Resource and Economic Development Division have been pertinent to the development of our oversight strategy. In particular, it seems that your staff may be able to provide significant assistance in identifying evaluation issues and synthesizing evaluative information relevant to conservation programs.

APPENDIX I

Further, your assistance would prove helpful in specifying the information needed from the executive departments and agencies to support the Committee's oversight, both for this particular review as well as our continuing oversight on conservation programs. This work would also contribute toward our December 8, 1975 request for GAO assistance in developing the Committee's overall information requirements.

Your cooperation in this matter would be very much appreciated. We therefore request that you provide general planning assistance to the Committee in identifying issues pertinent to the oversight of soil and water conservation programs.

We also take this opportunity to thank you for the excellent contributions of your Evaluation Synthesis Group in drafting the Committee's Budget Report and in conducting oversight of the Farmers Home Administration.

With every good wish, we are

Sincerely,

Herman E. Talmadge

HERMAN E. TALMADGE
Chairman

Bob Dole

BOB DOLE
Ranking Minority Member

EVALUATION QUESTIONS FOR EACH SOIL AND WATER CONSERVATION PROGRAM

A. AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE (ASCS) - AGRICULTURAL CONSERVATION PROGRAM (ACP)

The purposes of ACP are as follows:

a. to prevent or abate agriculture-related pollution of water, land, and air for community benefit and the general public good; and

b. to maintain and improve agricultural soil, water, woodland, and wildlife resources and assure their efficient multipurpose use in providing an adequate supply of food, fiber, water, and wildlife for the future and for the general improvement of man's total environment.

1. For each conservation practice, what farm and farmer characteristics indicate that cost-sharing will make it economically advantageous for the farmer to install or implement the practice? What is the necessary amount of cost-sharing? What is the amount necessary for the low-income farmer?

2. From the answers to question 1, and from the need for each practice or resource management system, what is the total requirement for cost-sharing?

3. For each practice, what is the net social value, including public benefits and the amount of cost-sharing?

4. How do the net social value of annual agreements, long-term agreements, pooling agreements, and small cost-share increases compare? What factors correlate to the higher net social values?

5. To what extent are requests for cost-sharing serviced in order of decreasing net social values of the practices?

6. How do the requests for cost-sharing correlate with the conservation problems in each county?

7. How do the requests which are actually filled correlate with the conservation problems in each county?

8. What percentage of total costs has been paid by cost-sharing for each practice? How does this percentage correlate with the amount deemed necessary in question 1?

B. ASCS - WATER BANK PROGRAM (WBP)

The purposes of the WBP are the following:

a. to conserve surface water;

b. to preserve and improve habitat for migratory waterfowl and other wildlife resources;

c. to reduce runoff, soil and wind erosion, and to contribute to flood control;

d. to contribute to improved water quality and to improve stream channel stability;

e. to contribute to improved soil moisture;

f. to reduce acres of new land coming into production and to retire lands now in agricultural production;

g. to enhance the natural beauty of the landscape; and

h. to promote comprehensive and total management planning.

1. How much wetland of each type and how much essential adjacent upland are protected under current agreements?

2. What is the value of each wetland under agreement for waterfowl production, other fish and wildlife objectives, flood protection, sediment and pollution control, groundwater recharge, and all other types of benefits?

3. To what extent has the loss of wetlands been prevented?

4. How much unprotected wetland could qualify for coverage under the WBP? What is the cost, in terms of lost benefits or expected damages, of not protecting this wetland?

5. To what extent do current agreements correspond to the most threatened and most valuable wetlands, in each county and throughout the nation?

6. To what extent do current agreements correspond to priority locations recommended by the Fish and Wildlife Service of the Department of the Interior?

7. To what extent do requests for agreements correspond to the wetlands most needing protection? What factors deter requests for agreements on wetlands most needing protection?

8. To what extent has the value of wetlands been enhanced?

9. To what extent have conservation and development practices been established and maintained in accordance with the terms of the agreement?

10. How much land has been temporarily released for haying and grazing? What is the estimated length of time this land will take to recover? What is the total amount of payments that will be forfeited because of these releases? What are the estimated losses arising from the emergency conditions which led to the releases?

11. What is the estimated cost of draining or otherwise destroying the wetlands protected by agreements? What is the estimated value of the wetlands if drained or otherwise destroyed?

12. What is the estimated cost of putting the adjacent uplands covered by agreements into agricultural production? What is the estimated value of these uplands for agricultural production?

13. How do the costs of drainage or putting lands into production and the value of the opportunity cost for wetlands and uplands correspond to the payment rate of the agreements? What percentage of this value is the payment rate?

14. What percentage of the number of water bank agreements is for wetlands which are also covered by State or Department of the Interior drainage easements?

15. What is the value of the added protection when a water bank agreement is piggybacked onto a drainage easement? How does this value correspond to the amount paid under the water bank agreement?

16. How many agreements have been terminated for each year in which the agreements were made?

17. How many of these terminations can be attributed to low or constant payment rates, change in ownership, and noncompliance?

18. How do the payment rates of agreements made in prior years correspond to the current established rates?

19. What is the net social value for each water bank agreement? Have all benefits been quantified and included in calculating this value? What is the net social value of protecting wetlands of different sizes?

20. Have the likelihood of drainage or other wetland destruction and the effect of agreement terminations been included in calculating the benefit-cost ratio?

C. ASCS - EMERGENCY CONSERVATION PROGRAM

The program purposes are as follows:

a. to assist farmers in controlling wind erosion on farmland; and

b. to rehabilitate farmlands damaged by wind erosion, drought, hurricanes, floods, or other natural disasters which (1) if not treated, will impair or endanger the land, (2) materially affect the productive capacity of the land, (3) represent damage that is unusual in character, and except for wind erosion, of the type which does not recur frequently in the same area; and (4) will be so costly to rehabilitate that Federal assistance may be required to return the land to productive agricultural use.

1. What are the types and extent of damage to farmland that have been covered under the program?

2. What new conservation problems were created by the damage? In what ways and to what extent would the damage have affected the land's productive capacity or impaired or endangered the land?

3. To what extent has the effectiveness of existing conservation practices been impaired by natural disasters, necessitating emergency assistance? To what extent has the program paid for the restoration of previously installed conservation practices?

4. What criteria are used to determine that the damage is so costly to rehabilitate that assistance will be required to return the land to productive agricultural use?

5. What percentage of applications for assistance are repeats; i.e., where the farm suffered similar damage at a previous time?

6. For flood damage, what is used as the basis for asserting that the flood is beyond the extent of usual or periodic flooding?

7. What percentage of the total who might be eligible for assistance actually apply for and receive it? Are there farmers in the same condition as a result of the natural disaster who themselves absorb the rehabilitation costs?

8. What types of conservation measures and practices have actually been installed?

9. What is the average cost and the range of costs for installing practices in response to natural disasters?

10. What is the relationship between the cost of rehabilitation and the percentage cost-shared?

11. What criteria or procedures are followed to determine reasonable costs and the part that the farmer can bear?

12. In what percentage of the cases where the farmer receives cost-sharing assistance to pay part of the rehabilitation costs is a loan from the Farmers Home Administration used to cover all or part of the remaining rehabilitation costs?

13. How often does the farmer install the conservation practices? How often does the farmer go out on contract? How often are both methods used?

D. FARMERS HOME ADMINISTRATION (FmHA) LOANS TO ASSOCIATIONS FOR IRRIGATION AND DRAINAGE AND OTHER SOIL AND WATER CONSERVATION MEASURES

Irrigation and drainage loans are made to associations primarily composed of farmers and ranchers to promote the application or establishment of soil and water conservation practices. Loan funds can be used for the construction, improvement, or enlargement of facilities for drainage and the conservation, development, use, or control of water for irrigation.

1. What conservation practices have been installed with this type of loan assistance? How many of these loans are used for irrigation and drainage?

2. What are the characteristics of those who apply for this type of loan? What are the reasons they cannot obtain credit from other sources?

3. What is the net social value of installing practices with this type of loan assistance?

4. What criteria are used to determine when loan assistance is warranted in terms of an area's conservation problems, the characteristics of its farms or other areas, and the characteristics of its farmers or other rural residents?

5. To what extent are farmers or other rural residents not participating in an association and thus decreasing the net social value of the project?

6. To what extent are services of other programs necessitated by these loans? What are the net social values for these services?

7. What are the costs of installing and operating practices through associations? How do these costs compare with installation and operation without associations? What would these costs be without Federal absorption of part of the loan costs?

8. If there are insufficient funds to meet the needs for this type of loan, what increases in public costs are likely to arise from deferrals?

9. What is the distribution between public and private benefits of practices installed with these loans?

10. How do the requests for loans correspond with identified needs? Does the allocation of funds on a "first-come, first-served" basis maximize the benefits received from the available program funds?

11. How does the disbursement of association loan funds correspond to the conservation problems of the area covered by the association?

12. What is the default history for this type of loan? Has the cost of defaults been incorporated into the cost portion of the benefit-cost ratio?

E. FmHA - RESOURCE CONSERVATION AND DEVELOPMENT (RC&D) LOANS

The purpose of this program is to make loans available to sponsoring local public bodies, agencies, and nonprofit

organizations to assist them in paying for the local cost portion of RC&D measures. These loans may be made in areas authorized for Resource Conservation and Development program assistance by the Secretary of Agriculture and for which a plan design or area plan has been accepted by the State SCS Conservationist.

1. What conservation practices and other community benefits have been developed with this kind of loan assistance?

2. What are the characteristics of the sponsoring organizations who apply for this type of loan?

3. What are the characteristics of those sponsoring organizations who receive the loan assistance? How many loans are made each year under the program? How many loan requests and in what amount are unable to be funded each year due to a lack of funds? What is the estimated total need for this type of loan?

4. What is the net social value of installing practices with this type of loan assistance, using public benefits and costs, for that portion of RC&D projects for which the loan is made?

5. What is the distribution between public and private benefits for that portion of RC&D projects for which the loan is made?

6. How do the requests for loans correspond with identified needs?

7. What is the default history of this type of loan? Has the cost of defaults been considered in determining the net social value of these projects?

F. FmHA - WATERSHED LOANS

The purpose of this program is to assist sponsoring local organizations to plan and carry out works of improvement for protecting and developing the land and water resources or other community resource in small watershed or subwatershed project areas.

1. What are the works of improvement for which this type of loan has been made? What conservation practices have been installed with this type of loan assistance?

2. What types of sponsoring local organizations have been receiving watershed loans?

3. From the extent of conservation problems and the expected requirements for solving these problems with watershed projects, what is the expected requirement for watershed loans? How many loan applications and in what amount have been rejected because of a lack of funds?

4. What is the net social value of installing practices or achieving community benefits with this type of loan for that portion of watershed projects for which loans have been made?

5. What is the distribution between public and private benefits for that portion of watershed projects for which loans have been made?

6. How do loan requests and loan disbursements correspond with identified conservation problems or community needs in the area?

7. To what extent have repayments adhered to payment schedules? Have the costs for any delays or deferrals in repayment been included in computing the costs of these loans?

G. FmHA - SOIL AND WATER LOANS TO INDIVIDUALS

The purpose of this program is to provide assistance to farm tenants and landlords in carrying out (a) soil and water conservation measures; (b) agricultural, animal, and poultry waste pollution abatement measures which will help them maintain their farming operations; and (c) energy conservation measures.

1. What conservation practices have been installed with this type of loan assistance? How many of these loans have been for irrigation, pollution control, soil conservation, and energy conservation purposes?

2. What are the characteristics of those who apply for this type of loan? What are the reasons they cannot obtain credit from other sources?

3. What are the characteristics (e.g., farm and farmer characteristics and need for particular types of conservation practices) that indicate a need for this type of loan? What is the total expected need for this type of loan?

4. What is the net social value of installing practices using this type of loan? What is the net social value for these loans when the initial principal payment is deferred?

5. What is the distribution between public and private benefits of practices installed with these loans?

6. What is the default history for this type of loan? Has the cost of defaults been included in computing the costs of these loans?

7. How do the requests for loans correspond to the needs for such loans as indicated by the need for particular practices and by the financial condition of those who must install the practices?

H. FOREST SERVICE - STATE AND PRIVATE FORESTRY PROGRAM, RESEARCH PROGRAM, AND NATIONAL FOREST SYSTEM

The land and water program of the Forest Service is based on the fundamental stewardship activities that must be performed on all forest and related range lands to assure that the productivity and quality of the soil, water, and ecosystems are kept intact and healthy. The Forest Service does not have separate legislative programs for land and water conservation; its land and water activities are an integral part of the total Forest Service program. For instance, the National Forest System and State and Private Forestry programs, supported by research, are guided by the principles of sustained yield and multiple use of the forest and rangeland resources. In addition to basic stewardship, the management of range, timber, wildlife, and recreation resources are aimed at protecting and/or enhancing the land and water resources.

State and Private Forestry

1. What program activities, used to accomplish any of the goals of cooperative forestry assistance on State and private forests, have an impact, positive or negative, on soil and water conservation problems?

2. Which of these program activities also have significant purposes not related to soil and water conservation?

3. Under what circumstances (i.e., program activity and conditions where the activity is warranted) must soil and water conservation impacts be considered?

4. What criteria determine where treatments for soil and water conservation on State and private forests are warranted?

5. What soil and water conservation practices will be required to deal with conservation problems arising from increased use of State and private forest resources? What will be the net impact of State and private forestry programs on soil and water conservation?

6. Based on the soil and water conservation problems emanating from State and private forests, and the corresponding need for specific practices to deal with these problems effectively, what is the total requirement for technical, planning, and financial assistance for State and private forests?

7. What is the estimated impact on soil and water conservation problems of practices actually installed in State and private forests? To what extent have needed practices not been installed? To what extent have installed practices not achieved their design objectives?

8. What is the effectiveness of the various State and private forestry programs in getting needed conservation practices installed?

9. What criteria determine when the owner or operator of State or private forests would not undertake to install conservation practices without Federal planning, technical, or financial assistance?

10. Under what circumstances should land within State and private forests be managed to achieve soil and water conservation purposes?

11. What are the public benefits and costs of each practice for which technical, planning, or financial assistance is provided to owners or operators of State and private forests?

12. To what extent has forest resource use in State and private forests been improved with respect to soil and water conservation?

13. To what extent are requests for planning, technical, or financial assistance serviced in the order of the decreasing net social value of the practices?

14. How do the requests for planning, technical, or financial assistance correspond to conservation problems?

15. To what extent are funds allocated according to the ability to obtain installation of practices and the net social value of the practices?

16. To what extent does the conversion of State and private forestland to other uses negate the benefits obtained from previous installation of conservation practices?

National Forest System

1. What program activities used to accomplish any of the goals associated with management of the National Forestry System have a positive or negative impact on soil and water conservation problems?

2. Which of these program activities also have significant purposes not related to soil and water conservation?

3. Under what circumstances (i.e., program activity and conditions where the activity is warranted) must soil and water conservation impacts be considered?

4. Under what circumstances is the need for each soil and water conservation practice indicated? What are the net social values of installing these practices? Are these net social values considered in evaluating the net social values of each program activity?

5. What soil and water conservation practices will be required under the program planned for the National Forest System? What will be the net impact of this program on soil and water conservation problems?

6. What is the estimated impact on soil and water conservation problems of practices actually installed in the National Forest System? To what extent have the desired practices not been installed? To what extent have installed practices not achieved their design objectives?

7. Where the National Forest System is being managed to provide services to others (e.g., timber, minerals, recreation, grazing), what portion of any fees charged for these services goes to mitigate soil and water conservation impacts? How much of the costs of installing conservation practices is not borne by the user?

8. Under what circumstances should land within the National Forest System be managed to achieve soil and water conservation purposes?

9. What is the net social value associated with managing National Forest System lands for soil and water conservation purposes?

10. To what extent are program activities associated with the National Forest System achieving the greatest opportunities for these lands?

I. SCIENCE AND EDUCATION ADMINISTRATION (SEA) - EXTENSION

This program disseminates practical conservation information from land-grant universities and the USDA to the public and private sectors to help them protect and manage rural America's soil and water resources. It also contributes to the development of natural resources for the enjoyment of rural and urban people.

1. What information on conservation needs is used to identify the need for information about (a) the existence of conservation programs, (b) the existence of conservation problems, (c) the existence of solutions to conservation problems, and (d) procedures to be followed in installing conservation practices?

2. How effective are meetings, demonstrations, workshops, short courses, publications, mass media, and follow-up consultation in solving conservation problems or in increasing awareness of conservation programs, problems, and solutions?

3. How effective is each educational technique in solving conservation problems or in meeting needs for information?

4. How well do educational activities actually performed in each county correspond to the activities that should be performed because of the county's conservation needs?

5. What are the current unmet educational needs of those who should be aware of solutions to particular conservation problems; i.e., to what extent are such people aware of the existence of conservation problems, the existence of solutions, and the availability of conservation programs to assist in installing the necessary conservation practices?

J. SOIL CONSERVATION SERVICE (SCS) - CONSERVATION OPERATIONS

This program, first authorized in 1935, provides technical assistance designed to reduce erosion, solve soil and

water management problems, bring about physical adjustments in land use, improve agriculture, and reduce damage caused by floodwater and sedimentation.

1. From the need for each practice, what is the total requirement for technical assistance?

2. What are the technical assistance planning costs and application costs for each practice? Under what circumstances are these costs (if the farmer had to pay them) sufficient to make it economically disadvantageous for the farmer to adopt the practice on his own?

3. Considering only public benefits and planning and application costs, what is the net social value of each practice for which technical assistance is provided? How do the net social values of the planning phase compare with those of the application phase?

4. To what extent are requests for technical assistance serviced in order of decreasing net social values of the practices?

5. How do the requests for technical assistance correlate with the conservation problems in each county?

6. How much technical assistance is provided in direct support of other programs? Using the net social values of the practices or resource management systems for which the assistance is provided, what is the overall net social value of the assistance provided for each program? How do these net social values compare with those for the technical assistance that does not support any other program?

7. What is the proportion of technical assistance for planning and for application? How does the overall net social value for these phases compare in each county?

8. What percentage of planning efforts results in application technical assistance?

9. What proportion of the practices appearing in conservation plans are actually installed or implemented?

10. What percentage of the requests for technical assistance results in referrals for cost-sharing or loans?

11. To what extent have cooperative agreements been implemented? What are the reasons that all or part of such agreements have not been implemented?

12. What is the expected net social value for practices on lands not covered by cooperative agreements?

K. SCS - WATERSHED PLANNING AND OPERATIONS PROGRAMS (P.L. 83-566)

The overall objective of the small watershed planning activity is to help sponsoring local organizations devise plans for watersheds not exceeding 250,000 acres for the following purposes: watershed protection; conservation and proper utilization of land; flood prevention; agricultural water management, including irrigation and drainage; public water-based recreation; public fish and wildlife (harvesting and habitat improvement); municipal and industrial water supply; water quality management; groundwater supply; agricultural pollution control; and other water management.

1. For each project, what is the extent of watershed problems, including those associated with (a) conservation and proper utilization of land, (b) conservation, development, utilization, and disposal of water, and (c) damages from erosion, floodwater, and sediment?

2. For each project, what proportion of the problems will be solved? How much of each problem will be solved through (a) land treatment measures, (b) nonstructural measures, and (c) structural measures?

3. For each project, which measures cannot be installed by individual landowners or small groups of landowners? To what extent is this inability due to the lack of available cost-sharing funds? To what extent is this inability due to benefits accruing to communities, groups of landowners, or the general public who are not eligible for cost sharing?

4. With respect to financial assistance costs, what is the net social value of the land treatment measures of the watershed project as compared with the net social value of practices installed under other programs?

5. With respect to financial assistance costs, what is the net social value of the various project measures as compared with the net social value of practices installed under other programs with cost-sharing assistance?

6. What proportion of the outstanding problems in the watershed is handled under the new cooperative agreements made to reach a total coverage of 50 percent of the land in the drainage area?

7. What proportion of the outstanding problems in the watershed reflect the fact that cooperators have not fully implemented the measures in their farm plans?

8. How much of the outstanding problems in the watershed is due to the absence of cooperative agreements?

9. How much of the outstanding problems in the watershed is due to critical areas? To what extent will uncontrolled critical areas, not covered under the 75 percent requirement, cause an increase in the cost of construction, operation or maintenance of the project? Since conservation practices are not 100 percent effective, what will be the residual problem from those critical areas which are included in the 75 percent requirement? To what extent will this residual problem cause an increase in the cost of construction, operation, or maintenance of the project?

10. To what extent are projects being operated and maintained in accordance with the initial agreement?

11. To what extent are land treatment measures, land stabilization measures, and nonstructural measures being operated and maintained in accordance with the initial agreement? Specifically, to what extent is sediment accumulation reducing the effective life of retention reservoirs?

12. With respect to loan costs, what is the net social value of the various project measures as compared with the net social value of practices or projects installed elsewhere with loan assistance?

13. To what extent do the administrative costs associated with watershed projects, when allocated as overhead expenses to technical, cost-sharing, and loan assistance, decrease the net social value of this assistance?

L. SCS - FLOOD PREVENTION OPERATIONS PROGRAM (P.L. 78-534)

The objective of the flood prevention operations program is to help sponsoring local organizations prepare and implement plans within 11 authorized watersheds to accomplish the following purposes: watershed protection; conservation and proper utilization of land; flood prevention; agricultural water management, including irrigation and drainage; public water-based recreation; public fish and wildlife (harvesting and habitat improvement); municipal and industrial water supply; water quality management; groundwater supply; agricultural pollution control; and other water management.

1. For each project in the 11 designated watersheds, what is the extent of watershed problems, including those associated with (a) conservation and proper utilization of land, (b) conservation, development, use, and disposal of water, and (c) damages from erosion, floodwater, and sediment?

2. For each project in the 11 designated watersheds, what proportion of the problems will be solved? How much of each problem will be solved through (a) land treatment measures, (b) nonstructural measures, and (c) structural measures?

3. For each project in the 11 designated watersheds, which measures cannot be installed by individual landowners or small groups of landowners? To what extent is this inability caused by the lack of available cost sharing funds? To what extent is this inability due to benefits accruing to communities, groups of landowners, or the general public who are not eligible for cost sharing?

4. With respect to technical assistance costs, what is the net social value of project land treatment measures as compared with the net social value of practices installed under other programs with cost-sharing assistance?

5. With respect to financial assistance costs, what is the net social value of the various project measures, as compared with the net social value of practices installed under other programs with cost-sharing assistance?

6. What proportion of the unresolved problems in the watershed is handled under the new cooperative agreements made to reach a total coverage of 50 percent of the land in the drainage area?

7. What proportion of the unresolved problems in the watershed reflects the fact that cooperators have not fully implemented the measures in their farm plans?

8. How many unresolved problems in the watershed are due to the absence of cooperative agreements?

9. How many unresolved problems in the watershed are due to critical areas? To what extent will uncontrolled critical areas, not covered under the 75 percent requirement, cause an increase in the cost of construction, operation, or maintenance of the project? Since conservation practices are not 100 percent effective, what will be the residual problem from those critical areas which are included in the 75 percent requirement? To what extent will this

residual problem cause an increase in the cost of construction, operation, or maintenance of the project?

10. To what extent are projects being operated and maintained in accordance with the initial agreement?

11. To what extent are land treatment measures, land stabilization measures, and nonstructural measures being operated and maintained in accordance with the initial agreement? Specifically, to what extent is sediment accumulation reducing the effective life of retention reservoirs?

12. With respect to loan costs, what is the net social value of the various project measures as compared with the net social value of practices or projects installed elsewhere with loan assistance?

13. Do the administrative costs of watershed projects, when allocated as overhead expenses to technical, cost-sharing, and loan assistance decrease the net social value for this assistance?

M. SCS - EMERGENCY WATERSHED OPERATIONS (P.L. 81-516, Sec. 216)

The purpose of this program is to help sponsoring local organizations safeguard lives and property from hazardous conditions brought on by natural disasters. Achieving this objective calls for the planning and installation of emergency watershed protection measures.

1. What types of impairment in a watershed are deemed to constitute an emergency situation?

2. What were the hazards to life and property in those emergencies for which funding was provided?

3. What percentage of the funding was expended on permanent or longlife measures? In what ways was the need for these measures different from their ordinary uses?

4. For those emergencies caused by flooding, in what ways did the flood events differ from the expected flooding pattern of the watershed?

5. For those emergencies where permanent or longlife measures were considered the most economical and expeditious way to alleviate the critical situation, what percentage of the costs were required to alleviate the emergency? What was the benefit-cost ratio for the remaining expenditures?

6. What kinds and quantities of emergency measures have been installed or implemented?

7. In what percentage of cases involving removal of debris and obstructions was the stream channel returned to its preflood condition rather than being channelized?

8. What is the distribution of the time lags between the emergency event and installation of the emergency measures?

N. SCS - RESOURCE CONSERVATION AND DEVELOPMENT (RC&D) PROGRAM

The program is designed: (a) to help local sponsors in multiple-county, authorized, RC&D areas develop a long-range area plan that provides a framework for local people to initiate and execute a program of economic development and environmental improvement for agricultural areas through natural resource conservation and development; and (b) to help sponsors implement their RC&D area plan by providing technical and financial assistance to install approved RC&D measures. The purposes of RC&D measures are to improve community attractiveness; to encourage new, private investments; and to enhance the environment for rural living with sound, well planned use of available resources.

1. By what criteria should the success of projects be measured?

2. What types of conservation and economic development measures have been installed in project areas? What is the distribution of project measures directed toward natural resource concerns and those toward economic development objectives in each project area? What are the specific objectives of these measures?

3. To what extent do the combined objectives of the measures implemented in each area correspond to the conservation or development problems of the project area? To what extent do local developmental preferences correspond to national assessments of the problems in the project area?

4. To what extent are installed conservation or development measures meeting their design objectives? What is the relationship between the characteristics of the project area and the likelihood of successful measures under the project?

5. To what extent have the conservation, development, and utilization of natural resources been accelerated in each project area? What is the status of conservation problems in project areas as compared to those in nonproject areas? Is the overall commitment of Federal, State, and local resources greater in project areas as compared to nonproject areas?

6. To what extent have employment and economic opportunities increased for people in project areas?

7. What are the total impacts and costs of installing conservation and economic development measures in each project area? What is the distribution of the net social value for each measure within a project area?

8. What additional costs in installing conservation and economic development measures are due to administrative costs of the program? Are the net social values of RC&D measures higher in comparison to other programs because of this program's more comprehensive planning? To what extent does accelerating the conservation, development, and utilization of natural resources increase benefits?

9. To what extent do any changes in the project from the proposal stage to the implementation stage affect the project's net social value?

10. To what extent does the RC&D program centralize decision-making in Federal, State, and local agencies with respect to the conservation and utilization of land and water resources, and with respect to economic development issues? To what extent has coordination among all levels of government in natural resource planning and rural development been improved in each project area?

11. To what extent are activities of USDA and other Federal agencies directed by the resource conservation and development process for natural resource planning and rural development in each project area?

12. To what extent have the additional processing requirements of this program led to increases in the time required to install or implement conservation and economic development measures?

O. SCS - GREAT PLAINS CONSERVATION PROGRAM

The Great Plains Conservation Program is designed to provide technical and cost-sharing assistance, under long-term contracts, to land users in designated counties of the

10 Great Plains States. It provides needed protection and improvement of soil, water, plant, and wildlife resources through adjustments in land use, reduction of wind and water erosion, and abatement of agriculture-related pollution.

1. From the specific practices that are likely to be required to handle the conservation problems in the Great Plains area, how much technical assistance and cost-sharing will be required, considering the cost-share rates needed to induce owner or operator participation?

2. For each practice, what is the relationship between the cost-share rate and the increased income-producing potential brought about by the practice?

3. What are the public benefits and costs of practices actually installed?

4. What is the relationship between the net social value and the length of a contract, for each practice?

5. How does the net social value of pooling agreements compare to that of individual contracts?

6. To what extent are requests for technical assistance and cost-sharing serviced in the order of decreasing net social value?

7. How do requests for technical assistance and cost-sharing correspond with the conservation problems in each county?

8. How do the requests which are actually filled correlate with the conservation problems in each county?

9. What percentage of planning assistance efforts leads to the actual installation of practices? To what extent do the operational plans require resources from other programs for their successful implementation?

10. To what extent are conservation treatments and application sequences being followed?

11. To what extent are installed conservation treatments achieving their design objectives?

12. To what extent have applied conservation treatments failed to achieve the desired results, thus requiring treatments beyond those specified in the original contract?

P. SCS - RURAL CLEAN WATER PROGRAM

The Rural Clean Water Program provides cost-share and technical assistance to private land owners or operators to install conservation measures in project areas with critical water quality problems resulting from agricultural activities. Participation is voluntary, but requires an approved agricultural portion of a water quality management plan.

1. What practices have been identified as possible best management practices?

2. What criteria will determine that particular land is eligible for cost-sharing under one of the best management practices?

3. What level of cost-sharing is required to make it economically feasible for a farmer to install each practice? Does this level vary with different farm characteristics, such as size, cropping pattern, and land capability class?

4. What is the net social value for each installed practice?

5. To what extent can the water quality problems of an area be attributed to agricultural sources or to private lands?

6. To what extent do project areas with adequate participation levels correspond with the location of the most serious nonpoint source pollution?

7. To what extent do priorities for land to be treated correspond with the most serious nonpoint source pollution problems?

8. How do requests for cost-sharing correspond with the nonpoint source pollution problems within the project area?

9. How much cost-sharing will be needed in each project area for its water quality problems associated with agriculture and what best management practices will probably be required?

10. What is the percentage of participation achieved in each approved project area?

11. What percentage of water quality problems within a project area will be solved according to the water quality plans of participants?

12. What is the relationship between percentage of owner participation and percentage of problems solved in each project area? What is the marginal cost-effectiveness of higher levels of participation? What is the marginal cost-effectiveness of achieving 75 percent participation?

13. What changes in food and fiber production are occurring as a result of practices installed in each project area?

Q. SCS - RURAL ABANDONED MINE PROGRAM

The Rural Abandoned Mine Program helps land users voluntarily develop reclamation plans and apply conservation treatment for the reclamation, conservation, and development of eligible coal-mined lands and water. It also provides cost-sharing to land users through long-term contracts according to an approved reclamation plan for establishing land use and conservation treatment on these lands.

1. With the specific practices that are likely to be required to reclaim specific types of mined land and the amount of each type, how much technical assistance and cost-sharing will be needed for each priority class, considering the percentage of costs which must be paid to induce participation?

2. What is the income-producing potential of different types of mined land? How much of this income-producing potential depends on public use and benefit? What is the relationship between the cost-share rate and the income-producing potential of the mined land?

3. How are reclaimed mined lands being used?

4. How much mined land needing reclamation will not be eligible because of the 320 acre limitation for contract under one ownership?

5. What are the public benefits and costs of conservation practices actually installed in reclaiming mined land?

6. What is the distribution of the time required to reclaim different types of mined land? What are the public benefits and costs associated with the operation and maintenance of the applied conservation treatments?

7. What is the net social value for joint contracts as compared to individual contracts?

8. How do the applications for program assistance correspond to the needs for reclaiming mined lands? To what extent

are applications for program assistance filled in the order of decreasing net social value?

9. To what extent are conservation treatments and application sequences being followed?

10. To what extent are installed conservation treatments achieving their design objectives?

11. To what extent have applied conservation treatments failed to achieve the desired results, thus requiring treatments beyond those specified in the original contract?

12. What is the relationship between the net social value for a contract and the length of the contract?

APPENDIX III

EVALUATION QUESTIONS ABOUT SPECIFIC SOIL AND WATER CONSERVATION PROBLEMS

FOOD AND FIBER PRODUCTION

1. How many production acres of cropland are being lost?
2. How many production acres of pastureland are being lost?
3. How many production acres of rangeland are being lost?
4. How many production acres of forestland are being lost?
5. How many acres of prime agricultural land are being lost by conversion to irreversible uses?
6. How much of this land is being lost because of overlying, strippable mineral resources?
7. How much of this land is being lost because of urban or suburban sprawl?

SOIL EROSION FROM WATER

1. How much soil is being eroded by water on cropland, pastureland, forestland, and rangeland?
2. What is the effect of this erosion on productivity?
3. How much soil is being eroded by water from urban land?
4. How much soil is being eroded by water from mined land?
5. What is the amount of sediment damage?
6. What is the amount of shore and streambank erosion?
7. What is the impact of this erosion on water quality?
8. What is the impact of this erosion on aquatic habitat?
9. What is the amount of scouring on floodplains caused by water erosion?
10. How much sediment is being deposited on floodplains?
11. To what extent are the costs of controlling water erosion beyond the means of an owner or operator, i.e., do they reduce his competitive position?

SOIL EROSION FROM WIND

1. How much soil is being eroded by wind on cropland and rangeland?

2. How does wind erosion affect productivity?

3. To what extent are coastal areas being eroded by wind, and what does this damage cost?

4. To what extent are mined areas being eroded by wind, and what does this damage cost?

5. How much sediment damage arises from wind erosion?

6. How does wind erosion affect air quality?

7. What is the rate at which windbreaks are being removed, and how does this affect the amount of wind erosion?

8. To what extent are the costs of controlling wind erosion beyond the means of an owner or operator, i.e., do they reduce his competitive position?

IRRIGATION

1. What is the shortfall in the availability of water for irrigation?

2. How efficient are current irrigation distribution systems, and how much is this below the maximum obtainable efficiency?

3. What is the efficiency of on-farm irrigation systems, and how much is this below the maximum attainable efficiency?

4. How much erosion arises from irrigation?

5. How much municipal or industrial effluent can be used for irrigation?

6. To what extent are the costs for increasing irrigation efficiencies by reorganizing the irrigation system beyond the means of an owner or operator, i.e., do they reduce his competitive position?

7. To what extent are irrigation water demands depleting groundwater levels?

8. How much are irrigation return flows degrading water quality?

9. To what extent are irrigation return flows degrading aquatic habitats?

10. To what extent are irrigation return flows increasing the salinity levels of streams?

11. How do irrigation return flows affect fish and wildlife?

12. To what extent is a lack of maintenance of irrigation systems reducing their efficiency, and how much of this lack of maintenance is due to costs that reduce the competitive position of an owner or operator?

DRAINAGE

1. To what extent does excess wetness reduce crop selectivity and productivity?

2. To what extent does excess wetness increase the costs of agricultural operations and the use of energy?

3. What public benefits can be gained by increasing crop selectivity and productivity on lands with excess water?

4. What public benefits can be gained by reducing the costs of agricultural operations and the use of energy on lands with problems of excess water?

5. What is the need for surface drainage systems to increase crop selectivity and productivity and to decrease the costs of agricultural operations and energy use on lands with excess water?

6. How much drainage is required to control water table levels?

7. To what extent do drainage systems reduce natural water storage and thereby increase the amount of flooding?

8. How effective are existing drainage systems?

9. To what extent does the lack of ditch and structural maintenance reduce the effectiveness of existing drainage systems?

10. To what extent do existing drainage systems reduce water table levels below acceptable levels?

11. To what extent are the costs of drainage system installation and maintenance beyond the means of an operator, i.e., do they reduce his competitive position?

12. What is the impact of drainage on fish and wildlife?

WATER SUPPLY

1. To what extent are demands for water not being met?

2. To what extent are unmet demands caused by sediments and related pollutants?

3. How many demands are unmet due to the lack of water?

4. To what extent are unmet demands caused by depletion of groundwater?

5. How many demands are unmet because sufficient surface storage is lacking?

WATER QUALITY

1. How much do sediment and related pollutants degrade water quality?

2. To what extent do livestock wastes degrade water quality?

3. To what extent do irrigation return flows degrade water quality?

MINING

1. How much land is being converted from agricultural to mining use?

2. What is the impact of mining on water quality?

3. How much sediment damage arises from mining?

4. How much mined land needs to be reclaimed?

5. How does mining affect wetlands and fish and wildlife?

RECREATION

1. What demands for recreation are not being met?

2. How much is this unmet demand due to the lack of diversity in recreational facilities?

3. To what extent is this demand unmet because of reductions in the operation and maintenance of existing areas?

4. To what degree is this unmet demand caused by lack of facilities?

5. What historical and archaeological sites are being lost?

6. What visual resources are being lost?

7. What natural and scenic areas are being lost?

WILDLIFE HABITAT

1. How do farm and forestry practices affect wildlife habitat?

2. How much wildlife habitat is being lost from conversions in land use?

3. How much wildlife habitat is being lost by overgrazing?

4. How much wildlife habitat is being lost through the removal of windbreaks?

5. To what extent is there insufficient habitat for threatened and endangered species?

6. At what rate are wildlife migration routes being lost?

7. How does the loss of riparian vegetation affect wildlife habitat?

8. How much wildlife habitat in wetlands is being lost?

9. To what extent is wildlife habitat in wetlands being degraded?

FISH HABITAT

1. What demands for fish habitat are not being met?

2. To what extent is this unmet demand caused by sediment and related pollutants?

3. To what extent is this unmet demand caused by channel modifications?

4. How much demand is unmet because of other human activities?

5. How does the loss of riparian vegetation affect fish habitat?

6. What fish habitat in wetlands is being lost?

7. How much fish habitat in wetlands is being degraded?

EVALUATION QUESTIONS FOR ALL SOIL AND WATER CONSERVATION PROGRAMS

A. PROGRAM PURPOSES

1. What are the purposes of USDA soil and water conservation programs, individually and as a group?

2. Which purposes apply to each program?

3. Are the delivery mechanisms or unique features of each soil and water conservation program reflected in the list of purposes?

4. Has each purpose been stated so as to permit development of quantitative measures of progress?

5. Is each purpose essential only to soil and water conservation, or does it relate to some broader purpose? If the latter, how much should soil and water conservation programs be expected to contribute to the broader purpose?

6. What are the major soil and water conservation purposes; i.e., under which purposes can all others be grouped? Have the purposes been arranged hierarchically to show the relationships among them?

7. Has agreement been reached among all agencies as to the purposes of these programs?

B. PROGRAM OBJECTIVES

Problem statements

1. What soil and water conservation problems correspond to each purpose? Has the appropriate amount of detail necessary to describe each problem been identified?

Indicators for describing problems

2. What indicators must be used to describe each problem?

3. What criteria are used to ascertain whether each particular delivery mechanism is required?

4. Do the indicators describe the important aspects of each conservation problem?

5. For those conservation problems that do not now have acceptable indicators to measure the problem directly, what surrogate indicators can be used?

6. How can each indicator be used in program management or decisionmaking?

Estimating the extent of each problem

7. What procedures (direct measurement, statistical sampling, descriptive models, or predictive and planning models) are used to assess the extent of each problem?

8. To what degree has each predictive and planning model been validated?

9. What procedures are used to ensure the accuracy and reliability of the measurements and estimates used by USDA?

10. What sources of information can be used to estimate the extent of each problem?

11. What data systems or estimating procedures developed by other agencies are being used to estimate the extent of problems? What modifications are being used by USDA?

12. Which conservation problems cannot be adequately described with existing data or estimating procedures; what steps are being taken to fill these voids? To what extent do the activities of the soil and water conservation supporting programs fill these voids?

13. What assistance is provided to ensure that each locality has reliable estimates of the extent of each problem that concerns it?

14. Have the latest research results and findings been used to estimate the extent of each problem? What procedures are followed to ensure that this research is being used?

15. What is the current extent of each problem? (The questions in appendix III may help to identify what information is necessary to characterize the extent of specific conservation problems.)

16. What is the expected extent of each problem, based on current and foreseeable trends?

17. Does each county or local office have information on the extent of the problems with which it must be concerned, or are procedures available to each county for making estimates?

18. Using the criteria for ascertaining when a particular mechanism is required, what is the need for each particular program delivery mechanism? (See question 3 above.) (The questions in appendix II may provide further guidance in characterizing this need; many of the questions are designed to establish the need for each individual program.)

19. Based on the underlying causes of the conservation problems, what is the estimated number of units of each practice required to solve the problems?

20. What is each estimate's accuracy, reliability, and sensitivity to changes in the variables used for prediction?

21. What part of each problem falls within USDA's responsibility?

Establishing conservation objectives

22. With respect to current and proposed funding levels for individual USDA programs, what are the objectives for each soil and water conservation problem for each county and State and for the Nation?

23. How much of each objective will each program attain; i.e., what is the relative contribution of each program toward resolving conservation problems?

24. Are quantitative objectives (how much each problem will be resolved) set in each county and State and for the Nation?

25. What procedures, criteria, or other factors are now used in each county for allocating program funds?

26. To what extent do local authorities now use information on the extent of conservation problems within their jurisdictions as the basis for allocating funds?

27. To what extent do local authorities now use information about the impact of conservation practices and programs on the status or resolution of conservation problems as the basis for allocating funds?

28. What procedures are used by local, State, and national offices to rank the relative importance of conservation problems?

29. To what extent are State and county rationales in allocating funds documented and analyzed by the national office?

30. What allocation formulas and factors are now used nationally and in each State for distributing funds to conservation problems or programs?

31. To what extent should the allocation among all soil and water conservation programs be made at the local or State level, rather than, as now, at the national level?

C. PROGRAM EVALUATION

Program impact

1. What distinct activities or methods for promoting conservation are used in each program?

2. What is the need for each activity or method? How does the actual level compare to this need?

3. What number and types of practices have been installed under each program?

4. What procedures are used to determine (a) what practices have been installed throughout the country, and (b) whether this installation can be attributed to a particular program?

5. What information about site conditions is required to estimate the impact of each practice? To what extent are conditions present before and after practice installation known or able to be determined or estimated for each type of practice?

6. What is the impact of each program on the resolution of conservation problems? To what extent has each program met its objectives?.

7. To what extent is the sum of the impacts of practices installed under each program an indicator of changes in the status of conservation problems? What procedures are being developed to explain differences between the two?

8. What are the indirect effects and negative impacts of each program?

9. What is the distribution between public and private benefits for each program?

10. How much program and practice impact information is available to local offices of each agency? What steps are being taken to fill any gaps?

11. To what extent can changes in the status of a conservation problem be attributed to activities performed under USDA's conservation programs? To what extent are changes due to variables outside the control of the programs?

12. What procedures have been used to establish that there is a cause-effect relationship between program activities and inputs and the solution of conservation problems?

13. What is the percentage of cases in which an activity performed under a conservation program will lead to the installation of a conservation practice?

14. How much do site-specific conditions, practice management and maintenance, and installation variations affect the practice impact as estimated from research results?

15. If planning and prediction models have been used to establish relationships between program activities and conservation problems, what procedures have been used to validate that the predicted effects occur?

Program costs

16. What are the total costs of installing each practice? How do these costs vary from county to county?

17. What are the costs associated with the negative effects of installing the various practices?

18. What are the private and public costs of installing each practice?

19. To what extent do private benefits exceed private costs? To what extent are public costs used to provide private benefits?

20. What is the cost of each program activity? Have allocated costs been included?

21. How much do these costs vary from county to county?

Program effectiveness

22. What are the values of the measures of effectiveness (benefit-cost ratios or others) for each program or program activity in each county and State?

23. What is the variation in these indicators from county to county and from State to State? What are the reasons for this variation? What management improvements have been made in response to this variation?

24. To what extent do local offices use their resources to maximize the resolution of conservation problems? What is the potential in each county for increasing net social value achieved with their resources?

25. To what extent have each program's resources been optimally allocated? Could greater net social value have been achieved by each program under different allocations to local or State offices (as measured against a single objective or against multiple objectives with a ranking of the relative importance of each objective)?

26. What is the sensitivity of the results to different rankings of the relative importance of the conservation objectives?

Program necessity

27. What is each program's relative effectiveness in achieving objectives? Does program effectiveness vary by county? If so, have the conditions (such as farm type and size, land class, geographic region) been identified under which each program achieves its greatest effectiveness?

28. How much has the effectiveness of each program been considered in determining the funds allocated to it?

29. To what extent has each program used the same methods for ranking the relative importance of conservation problems and for assessing the impact and cost of each practice?

30. What procedures are used to determine the best program combination for getting a practice installed?

31. How does the effectiveness of programs dealing with unique conservation problems compare with that of other programs? If the effectiveness of these programs is lower, what intangible and unquantified benefits justify their use?

32. How does the effectiveness of USDA programs in achieving conservation objectives compare with the possible effectiveness of other methods, such as State and local programs, private sector activities, tax expenditures, and regulatory programs?

33. To what extent do technological changes, rather than Federal program intervention, achieve conservation objectives by improving farm management or farming operations?

D. PRACTICE EVALUATION

Practice conservation impact

1. Which conservation problems are affected by each practice? Have all the positive and the negative impacts of each practice been determined? Have aggregate effects been considered in identifying practice impacts?

2. How effective is each practice or resource management system in controlling the conservation problems of the places where it is installed or implemented?

3. What is the assessment methodology used to estimate the impact of each practice?

4. For each practice, have onsite private benefits that accrue to the farmer or owner been distinguished from public benefits (or damages avoided)?

5. What indicators should be used to measure the performance of each practice?

6. What procedures are being followed to ensure that all research relevant to determining the impact of practices will be consolidated?

7. To what extent do procedures permit an estimate of practice impact under all possible site conditions? Have potential inaccuracies in procedures been identified?

8. To what extent can estimated impacts be validated? What discrepancies, if any, have any validation attempts revealed?

Practice economics

9. What is the cost structure used for determining the costs of each practice?

10. What practices are likely to lead to significant changes in farm cropping patterns or production activities? What cost elements must be included in estimating the cost of these changes?

11. What procedures are used to estimate the direct costs attributable to practice installation?

12. What is the cost of installing or implementing each practice? How do these costs vary according to geographic region, farm type, farm size, land class, and other relevant parameters?

13. What procedures or models are used to estimate the changes in farm cropping patterns or production activities?

14. What changes in farm cropping patterns or production activities have been identified as arising from the installation of conservation practices? Have these estimates been validated?

15. What procedures or models are used to estimate the aggregate economic effects of installing practices?

16. What aggregate economic effects of installing conservation practices have been observed? Have these estimates been validated?

Strategies of practice installation

17. What is the net social value for each practice or resource management system? How does this value vary by State and county, farm type and size, and land class? To what is this variation attributable?

18. Under what circumstances, if any, would the private benefits to the farmer outweigh his costs (making it economically advantageous for the farmer to adopt the practice without any assistance)?

19. How do the impacts and costs of annual, management-type practices compare to the costs and benefits of the more enduring engineering practices (where they are alternatives to one another)?

20. To what extent does the attainment of conservation objectives impose undue burdens on particular geographic regions or crop sectors?

21. To what extent are there conservation problems for which adequate technical practices do not exist?

22. To what extent does attainment of conservation objectives impose undue burdens on farms of different size?

23. To what extent do the increasing use of marginal lands and the loss of prime agricultural land make it more expensive to deal with conservation problems?

24. To what extent can conservation practices contribute to reductions in energy use?

25. To what extent can conservation practices affect the retention of prime farmland, the shifting of crop production, the protection of wetlands, and the better use of floodplains?

Problems of practice adoption

26. What conservation practices are now installed or being followed by the Nation's farmers? What is the status of other conditions on the Nation's farms which indicate the need for conservation practices?

27. What is the need for each practice?

28. What factors (such as costs, lack of education, lack of benefits to the user, availability of technical assistance, reduced production efficiency, and technical capability of the practice) limit the impact of each practice (i.e., prevent the practice from having its greatest impact)?

29. What factors tend to prevent the installation or adoption of each practice?

30. What would be the effect of practice installation or implementation on the farmer's competitive position based on private benefits and costs, without any government assistance? What would be the effect on the low-income farmer's competitive position?

31. What necessary conservation practices are unlikely to be installed under existing programs?

32. What conservation problems are unlikely to be solved by existing practices and programs? Where are new practices or programs needed to solve conservation problems?

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APPENDIX V

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

DEC 7 1979

Mr. Henry Eschwege
Director, Community & Economic
Development Division
U. S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

We are pleased to respond to your letter of October 10, 1979, and to provide comments on the draft report entitled "A Framework and Checklist for Evaluation of Soil and Water Conservation Programs." This report appears to be the culmination of many hours of productive interaction between staff members of GAO and the USDA Land and Water Conservation Task Force in preparation for the Senate oversight activities of the past several years.

The Department is in full agreement with the need to establish a systematic framework for the evaluation of all programs, including those concerned with soil and water conservation. The "Framework" identifies many areas that must be considered in developing an evaluation system. The Department sees the "Framework" as a compendium of useful concepts and concerns that must become an integral part of program development, management, and evaluation if we are to carry out the mandates of Congress in an effective and efficient manner. We have already begun the process of internalizing these concepts. We believe that our evaluation activities will ultimately evolve into a standardized process which will meet the objectives and needs of the Congress.

The Department is committed to a thorough and forthright implementation of recent laws that require evaluation of its soil and water conservation programs. As you are aware, evaluation activities are now in process under such authorities as the National Forest Management Act of 1976 (NFMA), the Forest and Rangeland Renewable Resources Planning Act (RPA), the Soil and Water Resources Conservation Act of 1977 (RCA), and the Food and Agriculture Act of 1977. The RCA process, in particular, includes development of specific operating objectives for soil and water conservation programs, and establishment of a continuing process for evaluating programs with respect to those objectives. The programs that are ultimately recommended to the Congress by the Administration will be the result of a careful weighing of those objectives, the alternatives, and the tradeoffs--the same types of consideration that are stressed in the GAO report.

APPENDIX V

The Department feels that the list of questions will be helpful in reviewing individual program activities to aid development of specific evaluation designs. In many cases, the questions will help point out the need for data that could not otherwise become available without initiating special action. In addition, by having an overall framework for the evaluation of all soil and water conservation programs with supporting questions in each program area, it may be possible to specify in advance and provide for the collection of data that will be useful for more than one evaluation, thereby saving evaluation resources and time.

In 1977, the Agricultural Stabilization and Conservation Service (ASCS) with the cooperation and assistance of the Soil Conservation Service (SCS) and Forest Service (FS) implemented a pilot evaluation of the Agricultural Conservation Program (ACP). That project was designed to evaluate the impact of conservation practices through ACP on soil loss due to water erosion, water conservation, pasture and range improvement, and woodlot protection. As a result, the ASCS has implemented a continuous evaluation process for the Agricultural Conservation Program. The SCS has implemented an Applied Conservation Effects System (ACES) to make continuing national estimates of the impact of soil and water conservation achieved with SCS technical assistance. These two evaluation systems have been established to develop information on the efficiency and effectiveness of conservation practices, resource management systems, and programs. Impacts will be measured for changes in sheet and rill erosion, wind erosion, long-term productivity, energy savings, and water conservation and quality. ASCS, SCS, and other USDA agencies are cooperating in these two studies to reduce data collection and analysis costs and to investigate opportunities for a joint evaluation system.

Another ongoing study promises to provide information on the broad issue of agricultural land use change and the spillover effects of such conversion. The purposes of the joint USDA/CEQ National Agricultural Lands Study are: (1) to determine the nature, rate, extent, and causes of the losses in the land base of American agriculture; (2) to evaluate the economic, environmental, and social consequences of these losses; and (3) to recommend administrative and legislative actions, if found necessary, to reduce the losses suffered by the Nation as a result. The continuing loss of agricultural land may lead to more intensive use of remaining land and accelerated deterioration of soil resources. Therefore, the findings of this study will have a bearing on future soil and water conservation policy.

APPENDIX V

Mr. Henry Eschwege

The Department has benefited substantially from its interaction with GAO's staff on the matter of evaluating soil and water conservation programs. We expect to continue this dialogue in the future.

Sincerely,

Bob Bergland
Secretary

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