SOIL EROSION AND SEDIMENTATION IN THE GREAT LAKES REGION

Final Report
of the
Soil Erosion and Sedimentation Task Force
to the
Great Lakes Commission
November, 1987

PREFACE

The Great Lakes Commission, an interstate compact agency of the eight Great Lakes states, has long served as an information clearinghouse, regional coordinator and advocate for sound regional resource management programs and policies. Water quality issues and, in particular, those relating to nonpoint sources of pollution, have been of ongoing concern.

In March 1986, the Commission directed its attention to soil erosion and sedimentation problems in the Great Lakes basin. Building on earlier work, a Task Force with state and federal representation was formed and given the following charges:

- o to determine funding allocations for soil erosion and sedimentation control in the Great Lakes region;
- o to review and focus attention on successful field level information, technical assistance and cost-sharing programs;
- o to examine alternative incentive assistance to reduce soil erosion and sedimentation;
- o to develop a listing of emerging and longer term concerns for the region; and
- o to serve as a forum for the discussion and implementation of cooperative interstate initiatives for soil erosion and sedimentation control.

The Task Force very capably fulfilled these charges in preparation of this report. The text was accepted as a Task Force work product by the Commission at its October 1987 Annual Meeting. The findings and recommendations in the Executive Summary were adopted unanimously as Commission policy. A reconstituted Task Force will assist the Commission in the aggressive implementation of the many recommendations in the months ahead.

The report does not provide definitive, comprehensive treatment of the water quality impacts of soil erosion and sedimentation, nor was there an intent to do so. Rather, it focuses largely on agricultural soil erosion and sedimentation, documenting regional funding distribution and allocation; innovative programs and projects; and emerging and long-term concerns. It does recognize the difficulty in quantifying off-site water quality impacts and recommends additional research in that area by appropriate public agencies and institutions.

The report does provide, we believe, a blueprint and action strategy to address an important component of the larger Great Lakes nonpoint source pollution problem. As a shared product of the Great Lakes states with federal agency contributions, it speaks to the importance of a cooperative, regional approach in addressing a critical basinwide issue.

Sincere appreciation is extended to the Task Force membership and other contributors identified on the following page. Special thanks are extended to Jerry Wager for his time, energy and enthusiasm in his role as Task Force Chairman.

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EXECUTIVE SUMMARY

Soil erosion and sedimentation are serious problems in the Great Lakes Basin. Erosion, the detachment of soil particles by the actions of rain, wind and other factors, diminishes the productivity of the land resource base. Sedimentation, the deposition of eroded soil, fills harbors, streams and lakes and degrades water quality. Combined, erosion and sedimentation impact recreation, adversely affect fish and wildlife habitat, and cause federal, state and local governments to incur tremendous costs through increased dredging, ditch and stream channel maintenance, and damages to water treatment and conveyance facilities.

It is difficult to assess the magnitude of erosion and sedimentation problems in the Great Lakes region. Nationally, the amount of soil loss due to erosion is tremendous. The first National Resources Inventory (NRI) conducted by the U. S. Department of Agriculture in 1977 estimated the annual water-caused erosion from nonfederal land at 6.42 billion tons. This is equivalent to about 30 tons per person nationwide or an average of more than 200 tons per second. Based on estimates from the 1982 NRI, more than 900 million tons of soil are eroded annually in the eight Great Lakes States. This is the equivalent of 12 tons per person in the eight states.

Erosion and sedimentation are natural processes that can be accelerated or slowed by human intervention, but never stopped entirely. As long as the natural environment is altered there will be erosion and sedimentation. The challenge for resource managers is to minimize erosion rates and control sedimentation to maintain and improve land and water quality and productivity.

Erosion and sedimentation control activities, particularly on agricultural cropland, cannot be thought of as one-time remedies. They should be likened to a maintenance program where regular attention is required to have a desirable lasting effect. Land use practices are constantly changing, and erosion and sediment control programs must change as well, to be compatible and effective.

Soil conservation programs have traditionally emphasized the benefits of sustainable agricultural production through soil erosion minimization. While the public costs of erosion control programs are substantial, the benefits have been viewed by many as private ones, accruing only to individual landowners.

More recently, water quality and other environmental concerns have slowly led to the development of programs that address the relationship of soil erosion to the off-site damages caused by sedimentation. The public costs of many of these programs are enormous but there are significant public benefits realized through improvements in water quality, fish and wildlife habitat and recreational opportunities. Effective erosion and sediment control programs will also offset the need for increased dredging, stream channel and ditch maintenance, and may help reduce maintenance costs to water treatment and conveyance facilities.

The need for quantitative information on the off-site costs and impacts of soil erosion and sedimentation is critical. The relevance of this information to policy makers is the ability to assess whether dollars spent for remediation of damages from sedimentation can be better spent on programs that minimize and prevent soil erosion.

The focus of this document is soil erosion and sediment control in the Great Lakes Basin. The Basin includes portions of the eight States bordering the Great Lakes: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin, and the Canadian Provinces of Ontario and Quebec. Soil erosion and sedimentation do not occur within the strict confines of political boundaries; they occur within watersheds or drainage basins. Many of the efforts to control erosion and sedimentation have been implemented at levels that do not coincide with the hydrologic basin of the Great Lakes. Hence, this report examines the problem within both political and watershed boundaries, as dictated by the nature of available information.

Some sections of this report present information for the states as a whole, particularly in the discussions of state programs. However, reference is made to the Basin portion of the state whenever possible for consistency as well as comparison purposes.

The charge of the Great Lakes Commission to the Soil Erosion and Sedimentation Task Force is outlined in the preface to this report. Presented below are conclusions and recommendations proposed by the Task Force for adoption and implementation by the Great Lakes Commission.

CONCLUSIONS

FUNDING

Position Statement:

The Soil Erosion and Sedimentation Task Force finds that federal, state and local programs are not adequate to control soil loss through erosion or solve sedimentation problems in the Great Lakes Basin. Institutional arrangements are in place and erosion control programs to reduce soil loss are operating on a limited scale in all states, but funding and staff resources cannot address current and emerging needs. Also, primary emphasis has been on erosion control to maintain soil productivity rather than on improving both soil and water quality by reducing off-site transport of sediment. Sedimentation control programs to address water quality are not in place basin-wide and must be developed, funded and integrated with existing erosion control programs.

The Task Force finds that, historically, soil and water conservation efforts have been funded by the federal government, primarily as part of the Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS) programs. Other conservation-related agencies, such as the Cooperative Extension Service, utilize local and state appropriations, but still rely heavily on federal funds. While some states have enacted cost

sharing programs, soil conservation personnel are still largely supported by federal funds. However, at a time when new federal initiatives are requiring added commitment of agency personnel, resources available to support these programs are being reduced.

Hence, the Task Force finds that the Great Lakes States, while working for adequate federal support, must assume greater responsibility for financing erosion control programs. There is a need for dedicated sources of revenue to support state and local programs allowing for funding of innovative approaches to erosion control, thus reducing state reliance on federal funding for these programs. The Task Force believes that federal support will continue to decline. Even at constant levels, federal support programs are inadequate to address the problems specific to the Great Lakes Basin.

Regionally, it is expected that the USDA Soil Conservation Service will have trouble maintaining activities at current levels. This is because the Great Lakes Basin does not have the high erosion rates that are driving federal programs nationwide, though Basin rates are still problematic.

Due to the pervasiveness of the erosion and sedimentation problem in the Great Lakes Basin, the Task force finds that no one level of government can be expected to shoulder the full burden of supporting programs. Funding must occur though a coordinated federal, state and local effort. This approach, however, does not preclude federal obligations to the states. There is a need for federal assistance to the states in areas of program development, technical support and research. There is a special need for federal agencies to focus on high priority problems, particularly those affecting multiple states and the Great Lakes themselves.

The Task Force believes that the Water Quality Act of 1987 (P.L. 100-04), in reauthorizing and strengthening the Clean Water Act of 1977 can be an important vehicle for federal, state and local agencies to promote erosion and sediment control through the achievement of water quality goals. The Task Force therefore supports full funding and implementation of the Water Quality Act of 1987.

The Task Force believes that the new program to manage nonpoint source pollution under Section 319 of the Water Quality Act of 1987 must emphasize sediment control. The Task Force supports the authorization of Section 319 of the Water Quality Act and full appropriation of the $400 million authorized over four years for state grants to implement approved nonpoint source programs. The Task Force believes that Congressional appropriation of the full amount is essential for the Great Lakes States. The Task Force further supports the use of Section 319 funds for: 1) implementation of nonpoint source management plans for sediment control at the local level; and 2) implementation of U.S. EPA and state phosphorus control strategies, which also have sediment control as the primary vehicle for reducing nutrient loads to the Great Lakes.

The Water Quality Act of 1987 also authorizes the creation of State Revolving Loan Funds under Section 602 to fund state and local water quality management efforts. The Task Force recommends that the Great Lakes States incorporate nonpoint source pollution management when developing their loan programs.

The Task Force believes that the Great Lakes National Program Office (GLNPO) of the U.S. EPA (Region V), established under Section 104 of the Water Quality Act, must emphasize sediment control and target special funds for such in nonpoint source pollution projects in the Great Lakes. Hence, the Task Force supports the maintenance of a strong monitoring program by the GLNPO that accommodates and focuses attention on nonpoint sources of pollution.

The Soil Erosion and Sedimentation Task Force believes that full funding and implementation of the Conservation Title of the Food Security Act of 1985 (Swampbuster, Sodbuster and Conservation Compliance Provisions and the Conservation Reserve Program) will also significantly strengthen erosion and sedimentation control efforts in the Great Lakes Basin. It is essential that Conservation Title programs complement on-going programs rather than substitute for them. Adequate staffing of the Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS) of the USDA is essential to the implementation of the Conservation Title of the Food Security Act and and other programs such as the Agriculture Conservation Program (ACP) and conservation technical assistance. This also requires additional assistance to Soil and Water Conservation Districts (SWCD) to help them meet added responsibilities under the Food Security Act.

The Task Force also advocates increased funding of the ACP program for special projects that provide water quality benefits to the Great Lakes Basin. Soil Conservation Service technical assistance and ACP cost-sharing should also emphasize off-site damage control, as well as the importance of soil conservation protection to the site.

PROGRAM DEVELOPMENT

Position Statement:

The Soil Erosion and Sedimentation Task Force recognizes the contribution of erosion and sedimentation control to the agricultural productivity and environmental quality of the water and related land resources of the Great Lakes Basin. The Task Force acknowledges the Great Lakes system as a special and unique international resource that deserves special attention and protection from the federal government.

Therefore, the Task Force advocates the establishment of a federal, line-item "Great Lakes Basin Program" within the U.S. Department of Agriculture budget to promote a comprehensive, basin-specific erosion and sediment control program. The program, to be modeled in part after the existing "Great Plains Program," shall provide for cooperative federal/state planning and management activities and include an educational component to encourage responsible land-use practices. There should be a linkage with the federal nonpoint source pollution program (Section 319 of the Water Quality Act) to specifically ensure cooperation and coordination of activities with the Environmental Protection Agency.

The Task Force also believes that sediment control programs emphasizing technical assistance, demonstration projects and education which

characterize current federal and local conservation programs in rural areas, should be developed for urban areas. These programs should emphasize managing stormwater and controlling erosion from construction sites.

STANDARDS AND CONTROL PROGRAMS

Position Statement:

The Soil Erosion and Sedimentation Task Force finds that, while significant benefits have been realized over the past 50 years to protect the land resource base from the effects of soil erosion through cost sharing and various incentive programs, the infusion of dollars alone is not enough to solve the massive problems of soil erosion and sedimentation. The Task Force finds the need for a more aggressive approach to erosion control to protect water quality and reduce the enormous public and private expenditures to mediate the off-site damages of sedimentation.

The Task Force believes the Great Lakes States should review their existing farm benefit programs to incorporate standards for meeting goals such as T (tolerable soil loss). Wisconsin, for instance incorporates "cross compliance" provisions in its Farmland Preservation Program to promote soil conservation. Counties must develop a farmland preservation program and landowners must meet soil conservation standards to be eligible for property tax credits.

The Task Force believes that the Great Lakes States should establish minimum erosion control standards for urban and rural land use activities phasing implementation over a period of years similar to the federal Farm Bill.

The Soil Erosion and Sedimentation Task Force believes that the loss of soil from urban areas is a particular problem that contributes to excessive localized sediment loadings to lakes and streams in the Great Lakes Basin.

Erosion and transport of sediment in urban areas is caused primarily by construction activities and stormwater runoff. Although construction activities in urban settings affect relatively small areas of land, they can lose soil at rates 50-100 times that of cropland. Generally, control of urban erosion is addressed at the local level via municipal or county ordinances. However, the approach to urban erosion control is inconsistent; some localities conscientiously address the problem, while others have no programs.

The Task Force believes that localities should be more aggressive in their approach to urban erosion control by developing and implementing erosion control and stormwater management plans. Also, it is believed that state agencies should have the ability and authority to establish erosion and stormwater standards and enforce them in the absence of local controls. Further, states should develop a statewide standard for erosion and stormwater control that can be followed and implemented by local units of government.

Finally, the Task Force believes that the U.S. EPA and the states should consider establishing sediment guidelines to be incorporated in state and federal water quality standards.

EDUCATION/COALITION BUILDING

Position Statement:

The Soil Erosion and Sedimentation Task Force believes that a critical need exists for increased information and education on the effects of soil erosion and sedimentation in the Great Lakes Basin. Public awareness must increase, particularly as these issues relate to higher profile concerns such as toxic pollutants and groundwater contamination. Information focusing on problems tied to individual land use activities such as agricultural waste management, tillage practices and levels and rates of fertilization must draw attention to the need for proper land use planning. Increased networking and coalition-building between water conservation groups and environmental/wildlife groups must occur to build support for soil erosion and sedimentation control efforts in the Great Lakes Basin. The Task Force believes that a broad-based, ongoing initiative to disseminate information on soil erosion and sediment control efforts in the Great Lakes Basin is needed, to establish the network of these and other groups with similar interests and goals.

RESEARCH AND EVALUATION

Position Statement:

The Soil Erosion and Sedimentation Task Force believes that a substantial research program is needed to provide information in several areas and disciplines related to the issues of soil erosion and sedimentation.

Research efforts should be undertaken in the following areas:

- Quantifying Off-site Impacts of Sedimentation. Information on the off-site effects of sedimentation is lacking. Quantitative data on the off-site impacts of sedimentation in the Great Lakes Basin is particularly scarce. Impacts associated with sedimentation include increased dredging costs; increased stream channel and ditch maintenance; damage to water treatment and conveyance facilities; effects on recreation and wildlife; and, the transport of toxic pollutants with the sediment. No reliable figures are available detailing the extent of damages attributable to sedimentation or the public and private costs incurred for clean up. This information is critical for decision makers to utilize in allocating limited program dollars to areas where they will do the most good.

- Relating "T" to Water Quality Goals. The concept of achieving T, the level of soil loss that can be tolerated without impairing crop production provides a sense of priority setting for erosion control administrators. However, it precludes consideration of off-site damages to water quality and other aspects of the environment. There is a need to equate T with water quality goals, particularly for areas such as the Great Lakes region which are not highly erodible. Most of the areas in the Great Lakes portion of the eight states are eroding at rates of T or less; yet many areas are experiencing severe water quality problems from excessive sedimentation. Information on T versus

water quality is needed to allow the states to set an erosion control standard that they can adopt and enforce as part of their water quality standards.

- Chemicals Associated With Sediment. It is important to quantify the role that sediment plays in the transport of toxic pollutants. Fears over chemical pollution of both surface and groundwater have demanded closer scrutiny of farming practices. Pollutants from agricultural land areas include chemical fertilizers, pesticides, herbicides and nutrients from plant residue and animal wastes. From a management perspective, the role that sediment plays in the transport of toxics should be acknowledged as an important component in achieving water quality goals. Practices that reduce both erosion and chemical transport should be emphasized. Quantifying the role that sediment plays in the transport of toxics will assist managers in making these decisions.

- Effects of Erosion and Sediment Control Practices on Groundwater. It is important for state and federal soil erosion and sediment control programs to emphasize groundwater protection and to consider impacts of conservation practices on groundwater. Conservation tillage, for instance, retains water that might otherwise have run off into streams or other bodies of water. The water that is retained may infiltrate into groundwater and raise nutrient and pesticide levels in shallow aquifers. More quantitative information on the effects of erosion and sediment control practices on groundwater is needed in the Great Lakes Basin.

- Evaluation of Program Effectiveness. With limited funds, it is imperative that managers begin to critically evaluate the effectiveness of programs. Future funding needs and program orientation can be determined only by assessing the relative cost-effectiveness of current control programs, and the extent to which water quality problems can be attributed to soil erosion and sedimentation. With nonpoint sources of pollution it's very difficult to show a causal relationship when water uses are impaired. More research needs to be done in these areas. The Task Force also believes that current monitoring programs should be maintained, but the need exists to support monitoring efforts with other methods of evaluation (e.g., biomonitoring). These methods should be explored and developed.

- Sediment Standards. The Task Force believes that the EPA and the states should evaluate the use of sediment standards to be incorporated into state water quality standards. Historically, the relationship between sedimentation and water quality has not been adequately emphasized in the development and implementation of sediment control programs in the Great Lakes Basin. The Task Force believes state and federal research programs should evaluate the feasibility of setting sediment standards comparable to those that exist for other pollutants for achieving water quality goals.

RECOMMENDATIONS

GENERAL

1. The Great Lakes Commission accepts the report of the Soil Erosion and Sedimentation Task Force, and adopts the position statements presented above as general guidance in future advocacy efforts.

FUNDING

1. The Great Lakes Commission shall convey to its member states a recognition that the states should assume greater responsibility for financing soil erosion control problems in light of the pervasiveness of the problem and declining federal funds. In so doing, the states recognize that control must take place primarily at the local level with emphasis upon water quality considerations and off-site impacts. The Commission further recognizes that dedicated sources of revenue should be provided to support state and local delivery systems and fund innovative approaches to erosion control.

   The Commission shall convey these views, in its advisory capacity, to appropriate legislators, agricultural and water quality officials in its member states.

   The effort shall be initiated in October 1987.

2. The Great Lakes Commission shall advocate authorization for full funding of the nonpoint source program (Section 319) of the Water Quality Act of 1987. Under this Section, the Commission further calls for 1) a major role for the U.S. EPA in assisting states in sediment control as well as in the management of nonpoint sources of pollution; 2) use of funds for local level implementation of nonpoint source management plans; and 3) use of funds for implementation of the U.S. EPA's and state phosphorus control strategies. The Commission shall advocate adequate funding and staff resources at the U.S. EPA Great Lakes National Program Office authorized under Section 104 of the Water Quality Act.

   The Great Lakes Commission advocates the full appropriation of funds for the in-place pollutant demonstration program as provided for in Section 104 of the Water Quality Act of 1987.

   The Great Lakes Commission shall advocate these positions, as appropriate, via correspondence and testimony/presentations to the Great Lakes Congressional Delegation, the members of appropriate Congressional Committees, the Administration of the U.S. EPA, the Region V Administrator of the U.S. EPA, the Director of the U.S. EPA Great Lakes National Program Office, and other appropriate individuals and organizations.

   The Commission shall initiate the effort in October 1987 and continue as needed.

3. The Great Lakes Commission advocates full funding and implementation of the Conservation Title of the Food Security Act of 1985. To implement these programs, the Commission urges adequate staffing of the Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS) in the Great Lakes Basin, and provision of program grants to states for use by local soil erosion and water conservation districts.

   The Commission shall advocate these positions, as appropriate, via correspondence and testimony/presentations to the Great Lakes Congressional Delegation, members of appropriate Congressional Committees, SCS and ASCS Administrators and other appropriate individuals and organizations.

   The Commission shall initiate this effort in October 1987 and continue as needed.

PROGRAM DEVELOPMENT

1. The Great Lakes Commission, in recognizing the contribution of erosion and sedimentation control to the agricultural productivity and environmental quality of the water and related land resources of the Great Lakes Basin, supports the establishment of a federal, line-item "Great Lakes Basin Program" within the U.S. Department of Agriculture budget to promote a comprehensive, Basin-specific control program. The program, to be modeled in part after the existing "Great Plains Program," shall provide for co-operative federal/state planning and management with special emphasis on coordination of activities with the EPA under Section 319 of the Water Quality Act, and include an educational component to encourage responsible land-use practices. To this end, the Great Lakes Commission will appoint a "Great Lakes Basin Program Task Force," with member state representation and other members, as appropriate, for the purpose of 1) designing in detail the elements, activities and funding levels of a proposed federal "Great Lakes Basin Program"; 2) developing an advocacy strategy to generate the state, federal and Congressional support needed to establish such a program; and 3) to advise the Commission in the conduct of such a strategy.

   The "Great Lakes Basin Program" Task Force membership shall be selected by the respective state delegations to the Commission by November 15, 1987. The Task Force will present a report on items one and two above to the Commission at its 1988 Semi-Annual Meeting, with its advisory role continuing through, but not beyond, the 1988 Annual meeting unless extended by action of the Commission.

2. The Great Lakes Commission acknowledges and endorses language in the Great Lakes Toxic Substances Control Agreement recognizing persistent toxic substances as the "foremost environmental issue confronting the Great Lakes" and calling for "new and creative initiatives" in addressing this complex problem. The Commission further acknowledges and endorses language calling for the expansion of federal initiatives for prompt remedial action on contaminated sediments and regular interstate work-shops on techniques for management of contaminated sediments.

The Great Lakes Commission supports prompt and expeditious implementation of Agreement provisions addressing the problem of contaminated sediments. In so doing, the Commission urges careful consideration of nonpoint source pathways by which toxic substances contaminate the environment via soil erosion and sedimentation.

The Great Lakes Commission shall convey, by November 1987, these positions to the Council of Great Lakes Governors, and the Great Lakes Environmental Administrators. The Commission shall coordinate, if requested, state input into workshops and other Agreement activities relative to soil erosion and sedimentation control and the management of contaminated sediments. Further, the Commission shall coordinate, if requested, a regional position relative to the expanding of federal programs and funding addressing the issues.

3. The Great Lakes Commission supports the convening of an Interstate Nonpoint Source Pollution Management Conference under Section 319 of the Water Quality Act of 1987 to develop an agreement among the states to reduce the level of pollution from nonpoint sources in order to improve water quality. The conference should involve all appropriate USDA and state agency personnel, directors of the Cooperative Extension Service, EPA officials and representatives from environmental and soil and water conservation groups from the eight Great Lakes States.

   The Commission shall contact the Region V Administrator of the U.S. EPA to encourage the conduct of such a conference and shall provide co-sponsorship services, as appropriate.

   The Commission shall make its contact in November 1987 and continue efforts, as needed, to ensure the conduct of such a conference.

STANDARDS AND CONTROL PROGRAMS

1. The Great Lakes Commission encourages its member states to assume a more aggressive approach to erosion control for water quality management purposes and to reduce the tremendous off-site impacts of sedimentation. In so doing, the Commission advises the states to: incorporate standards for soil erosion into existing farm benefit programs; consider incorporating "cross-compliance" provisions in its applicable legislation; and establish minimum erosion control standards for both rural and urban land use activities. With regard to the latter, the Commission believes that its member states should establish and enforce erosion and stormwater standards in the absence of local controls, and incorporate such standards into state water quality standards.

   The Commission shall convey these views to appropriate legislators, agriculture and water quality officials within its member states and thereafter support their implementation, as appropriate.

   The Commission shall initiate the contact in November 1987.

2. The Great Lakes Commission encourages U.S. EPA to consider establishing sediment guidelines for incorporation into federal and state water quality standards.

   The Commission shall convey this recommendation to the national and regional Administrators of the U.S. EPA and thereafter support implementation, as appropriate.

   The Commission shall initiate the contact in November 1987.

EDUCATION/COALITION BUILDING

1. The Great Lakes Commission shall prepare a concise briefing paper on erosion and sedimentation issues for transmittal to the Great Lakes Congressional Delegation. The Commission shall contact the North Central Office of the National Association of Conservation Districts (NACD) to explore co-sponsorship of a Congressional briefing on related issues of common concern.

   The initial contact shall be made in November 1987, with continuing work toward the conduct of a briefing session as needed.

2. The Great Lakes Commission shall encourage environmental organizations in the Great Lakes Basin to focus additional attention on the linkages between erosion and sediment control and environmental quality. The commission shall encourage interaction and strengthened cooperative relationships between the environmental and soil conservation interests.

   The Commission will use the Interstate Nonpoint Source Pollution Conference to begin the process, and will encourage continued interaction through more informal means in the future.

RESEARCH AND EVALUATION

1. The Great Lakes Commission supports an expanded research program -- at all levels of government -- to address the following issues: quantifying off-site impacts of sedimentation; relationship of soil erosion to water quality and other off-site considerations; quantifying the role of sediment in transport of toxic pollutants; the effects of erosion and sediment control practices on groundwater; the linkages between erosion and sediment control and dredging; alternate disposal of slightly and moderately polluted sediments; and evaluation of current and prospective control programs, including the feasibility of incorporating sediment standards into water quality standards.

   The Commission shall transmit a descriptive listing of such research needs, with rationale, to the U.S. EPA Administrator, Secretary of the U.S. Department of Agriculture, Agricultural Research Service, and other appropriate entities. The list shall further be transmitted to the Science Advisory Board and Council of Great Lakes Research Managers of the International Joint Commission, with special emphasis on Great Lakes water quality considerations.

The Commission shall urge the various Great Lakes area Sea Grant Programs, Institutes of Water Research; and grant-making foundations to recognize such research needs as their programs are developed and their project selection procedures are implemented.

The Commission shall initiate this effort in November 1987.

I. EROSION AND SEDIMENTATION IN THE GREAT LAKES

The Great Lakes Basin as an important agricultural region is not immune to the consequences of soil erosion and sedimentation. The costs of this erosion, and the subsequent sedimentation, are great. It has long been recognized that the agricultural sector pays for soil erosion in the form of lost nutrients, reduced crop productivity and the loss of arable land. Sedimentation, however, exacts a heavy monetary toll on the nation as a whole. There are costs that can be attributed to the sediment damage, including increased dredging, the loss of wildlife habitat, additional water treatment and the maintenance of stream channels and roadside ditches. Nationally, these off-site costs of erosion have been estimated to be more than $6 billion annually (Conservation Foundation, 1985).

As a result of these problems, the states in the region have a variety of programs that are designed to control soil erosion. However, a clearer understanding of the amounts, sources and costs of soil erosion in the region is a prerequisite for a realistic assessment of the need for increased soil conservation efforts in the Great Lakes region. This section of the report briefly discusses the issues associated with soil erosion and sedimentation problems in the Great Lakes States. No attempt has been made here to relate soil and sedimentation problems with the need for new programs or increased funding. Later sections will review the current erosion control efforts in the region, will identify innovative programs and will address emerging concerns for the region, referring to information presented here. Because of a lack of defendable, reliable data on the costs associated with soil erosion and sedimentation in the Great Lakes Basin, the descriptions that follow are primarily qualitative rather than quantitative.

A. AMOUNT OF SOIL LOSS

Before discussing the specifics on the extent and sources of soil erosion and sedimentation in the region, a review of some of the common terminology utilized in the soil conservation field will be useful.

DEFINITIONS

Soil Erosion: The wearing away of the earth's surface due to the actions of rain, wind and other climatic factors. The detachment and transport of soil particles, regardless of where the soil is deposited.

Soil Erosion Rates: The rate at which soil is eroding, usually measured in the United States as tons of eroded soil/acre/year.

Tolerable Soil Loss (T): The maximum rate at which soil can be eroded and maintain productivity. This rate must be calculated for each soil type, and is usually in the range of 2-5 tons/acre/year. It is not based on off-site impacts.

Sedimentation: The deposition of eroded soil, usually in a detrimental fashion in the context of this report.

Sediment Delivery Rate: The portion of the eroded material that is delivered to the waterways, usually measured as a percentage of gross erosion.

SOIL EROSION IN GREAT LAKES STATES

Based on the 1982 National Resources Inventory (NRI), more than 902 million tons of soil are eroded annually in the eight Great Lakes States. It should be noted that this figure refers to the Great Lakes states entirely and not just the Basin portion of the States. With the exception of Michigan, more state areas lie outside of the Basin then inside. Nevertheless, the amount of soil eroded annually in the Great Lakes Basin is tremendous. The 1982 NRI was conducted by the U.S. Department of Agriculture, and includes the most current and comprehensive information on the status of land use, soil conservation and erosion in the United States.

The main sources of soil erosion in the Great Lakes States are indicated in Table 1. About 67 percent of the erosion in the eight states occurs on cropland, which nationally makes up about 46 percent of the nonfederal rural lands. On a unit area basis, the soil erosion associated with streambanks, gullies, roads and construction is also very significant.

TABLE 1

ESTIMATED ANNUAL EROSION IN THE GREAT LAKES REGION, BY TYPE AND SOURCE

Land Use	Tons of Soil	Percent of Total Erosion
	Sheet, Rill and Wind Erosion	
Cropland	606,527,600	67
Pastureland	33,645,000	4
Forest Land	50,898,600	6
Other Rural Land	90,000,500	10
Total [a]	781,071,700	87
	Other Erosion	
Streambanks	73,760,000	8
Gullies	19,282,000	2
Roads	15,772,000	2
Construction	13,048,000	1
Total [b]	121,862,000	13
	Summary	
Sheet, Rill & Wind Erosion	781,071,700	87
Other Erosion	121,862,000	13
Total	902,933,700	100

Source: a 1982 National Resources Inventory, USDA-SCS
b 1977 National Resources Inventory, USDA-SCS

The relative significance of the different sources vary within the different states in the region. Tables 2 and 3 break the sources of soil erosion down by state.

TABLE 2

ESTIMATED ANNUAL EROSION IN GREAT LAKES STATES, BY SOURCE AND STATE
(millions of tons)

State	Cropland	Pastureland	Forest Land	Other Rural
Illinois	172.4	9.4	12.7	6.3
Indiana	84.7	5.5	2.8	14.9
Michigan	36.3	1.2	2.3	3.0
Minnesota	147.8	1.5	2.5	1.8
New York	17.4	1.7	1.8	3.0
Ohio	49.4	7.8	11.5	20.4
Pennsylvania	31.2	3.3	11.9	37.8
Wisconsin	67.4	3.2	5.5	3.0
Total	606.5	33.6	50.9	90.0

Source: 1982 National Resources Inventory. USDA-SCS.

TABLE 3

ESTIMATED ANNUAL EROSION IN GREAT LAKES STATES, BY SOURCE AND STATE
(millions of tons)

State	Streambanks	Gullies	Roads	Construction	Total of All Sources
Illinois	16.5	4.7	0.9	0.9	223.7
Indiana	15.1	0.7	0.2	0.9	124.7
Michigan	2.2	0.2	1.0	0.5	46.6
Minnesota	6.0	5.9	1.9	2.2	169.4
New York	11.9	2.4	6.1	1.1	45.3
Ohio	12.1	2.1	1.8	3.0	108.1
Pennsylvania	7.4	1.2	2.9	3.1	98.8
Wisconsin	2.6	2.3	1.1	1.3	86.3
Total	73.8	19.3	15.8	13.0	902.9

Source: National Resources Inventory 1978-1979 (Nov. 1980). USDA-SCS.

CRITICAL AREAS OF EROSION

As noted above, land use strongly influences the total amount of soil erosion that occurs. Nationally, cropland is the largest source of soil erosion. Streambanks, gullies, roads and construction sites also contribute a significant amount of erosion relative to their surface area. Forest lands usually have a small amount of soil erosion relative to their area. Yet, not all cropland is eroding at alarming rates; not all forest land is adequately protected.

In addition to examining the impact of the different land uses on the rates of erosion, it is also extremely revealing to note where the erosion is taking place within a land use. For example, although the 106 million acres of cropland in the eight Great Lakes states contribute a total of 607 million tons of eroded soil, not all cropland erodes at the same rate. Also, much of the cropland withing the Great Lakes states does not lie within the Basin. For the eight states, cropland that is eroding above the tolerable soil loss rate (T), contributes about 79 percent of cropland total tons of eroded soil, while representing only about 41 percent of the cropland. In fact, about 54 percent of eroded soil on cropland can be attributed to the 18 percent of the cropland with the most severe erosion, i.e. those areas with erosion rates greater than 2T. More revealing is the fact that the cropland within the Great Lakes Basin is for the most part not highly erodible; that is, eroding at rates less than T.

Cropland

The annual erosion due to sheet, rill and wind erosion on cropland, in relation to T, is presented by state in Table 4. Although the overall cropland erosion rate varies amongst the states, a disproportionate amount of the cropland erosion can be attributed to the areas eroding at greater than 2T in every case. Again, most of these highly erodible acres lie outside of the Basin.

Pastureland and Forest Land

The same trends can be seen in the pastureland and the forest land. A small percentage of the land is contributing the majority of the soil erosion. The annual erosion due to sheet, rill and wind erosion on pastureland and forest land, in relation to T, is presented by state in Tables 5 and 6, respectively. With the forest land, it should be noted that the bulk of the erosion is occurring in areas with grazing or timber harvesting activities.

Other Rural Lands

The most severe erosion on "other rural lands," including farmsteads, strip mines, quarries and pits, also occurs in pockets. In some of the states, particularly those with large mining industries like Pennsylvania and Ohio, the erosion on the other rural lands is a major source of the soil erosion in the state. However, the majority of the highly erosive other rural lands, such as strip mines, are not within the Great Lakes Basin portion of these states. The annual sheet, rill and wind erosion on other rural lands, in relation to T, is presented by state in Table 7.

Urban Erosion

Although the erosion from urban areas is not included as a separate category in the 1982 NRI, up to 90 percent of the soil erosion in urban areas is attributable to the lands under development, (i.e., construction and roads). Therefore, on a unit area basis the urban erosion is extremely significant. Also, many water quality experts believe that urban area sediments have more serious, prolonged effects on local water quality in streams, reservoirs, lakes and harbors than does sediment from rural areas.

TABLE 4

ESTIMATED AVERAGE ANNUAL EROSION (SHEET, RILL & WIND)
IN RELATION TO T, ON CROPLAND, BY STATE
(millions of acres/tons)

State	Less than T	T to 2T	More than 2T	Totals
Illinois				
acres	14.5 (59%)[a]	5.5 (22%)	4.7 (19%)	24.7 (100%)
tons	37.0 (21%)[b]	33.8 (20%)	101.6 (59%)	172.4 (100%)
Indiana				
acres	8.1 (59%)	3.2 (23%)	2.5 (18%)	13.8 (100%)
tons	18.5 (22%)	18.8 (22%)	47.4 (56%)	84.7 (100%)
Michigan				
acres	6.7 (71%)	1.8 (19%)	1.0 (10%)	9.4 (100%)
tons	11.2 (31%)	11.0 (30%)	14.1 (39%)	36.3 (100%)
Minnesota				
acres	10.2 (44%)	7.8 (34%)	5.0 (22%)	23.0 (100%)
tons	25.0 (17%)	54.2 (37%)	68.6 (46%)	147.8 (100%)
New York				
acres	4.3 (73%)	0.8 (14%)	0.8 (14%)	5.9 (100%)
tons	3.3 (19%)	3.5 (20%)	10.6 (61%)	17.4 (100%)
Ohio				
acres	8.5 (68%)	2.4 (20%)	1.5 (12%)	12.4 (100%)
tons	14.7 (30%)	12.3 (25%)	22.3 (45%)	49.4 (100%)
Pennsylvania				
acres	3.7 (62%)	0.8 (14%)	1.4 (23%)	5.9 (100%)
tons	3.5 (11%)	3.9 (13%)	23.8 (76%)	31.2 (100%)
Wisconsin				
acres	6.7 (59%)	2.5 (22%)	2.2 (23%)	11.5 (100%)
tons	12.2 (18%)	15.5 (23%)	39.6 (59%)	67.4 (100%)
Region Total				
acres	62.6 (59%)	24.9 (23%)	19.1 (18%)	106.7 (100%)
tons	125.4 (21%)	153.2 (25%)	327.9 (54%)	606.5 (100%)

[a] Percentage of state's (region's) total cropland acreage.
[b] Percentage of state's (region's) erosion from cropland.
Percentages may not add to 100 due to rounding.

Source: 1982 National Resources Inventory. USDA-SCS.

TABLE 5

ESTIMATED AVERAGE ANNUAL EROSION (SHEET, RILL & WIND)
IN RELATION TO T, ON PASTURELAND, BY STATE
(millions of acres/tons)

State	Less than T	T to 2T	More than 2T	Totals
Illinois				
acres	2.7 (85%)[a]	0.2 (6%)	0.3 (8%)	3.2 (100%)
tons	2.0 (21%)[b]	1.2 (13%)	6.2 (66%)	9.4 (100%)
Indiana				
acres	1.9 (84%)	0.2 (7%)	0.2 (8%)	2.2 (100%)
tons	1.4 (26%)	0.9 (16%)	3.2 (58%)	5.5 (100%)
Michigan				
acres	2.9 (98.5%)	0.03 (1%)	0.01 (0.5%)	2.9 (100%)
tons	0.7 (60%)	0.2 (13%)	0.3 (27%)	1.2 (100%)
Minnesota				
acres	3.5 (98%)	0.04 (1%)	0.03 (1%)	3.6 (100%)
tons	0.9 (58%)	0.2 (14%)	0.4 (28%)	1.5 (100%)
New York				
acres	3.8 (98%)	0.05 (1%)	0.04 (1%)	3.9 (100%)
tons	0.9 (56%)	0.2 (13%)	0.5 (31%)	1.7 (100%)
Ohio				
acres	2.2 (80%)	0.3 (9%)	0.3 (11%)	2.7 (100%)
tons	1.6 (20%)	1.2 (15%)	5.1 (65%)	7.8 (100%)
Pennsylvania				
acres	2.4 (91%)	0.1 (5%)	0.1 (4%)	2.6 (100%)
tons	1.0 (31%)	0.5 (16%)	1.7 (52%)	3.3 (100%)
Wisconsin				
acres	3.2 (96%)	0.09 (3%)	0.09 (3%)	3.4 (100%)
tons	1.3 (40%)	0.5 (15%)	1.5 (45%)	3.2 (100%)
Region Total				
acres	22.5 (92%)	1.0 (4%)	1.0 (4%)	24.4 (100%)
tons	9.9 (29%)	4.9 (15%)	18.9 (56%)	33.6 (100%)

[a] Percentage of state's (region's) total pastureland acreage.
[b] Percentage of state's (region's) erosion from pastureland.
Percentages may not add to 100 due to rounding.

Source: 1982 National Resources Inventory. USDA-SCS.

TABLE 6

ESTIMATED AVERAGE ANNUAL EROSION (SHEET, RILL & WIND)
IN RELATION TO T, ON FOREST LAND, BY STATE
(millions of acres/tons)

State	Less than T	T to 2T	More than 2T	Totals
Illinois				
acres	3.0 (88%)[a]	0.1 (4%)	0.3 (8%)	3.4 (100%)
tons	1.8 (14%)[b]	0.7 (6%)	10.2 (80%)	12.7 (100%)
Indiana				
acres	3.5 (96%)	0.05 (1%)	0.08 (2%)	3.6 (100%)
tons	0.4 (15%)	0.3 (10%)	2.1 (75%)	2.8 (100%)
Michigan				
acres	15.3 (99%)	0.06 (0.4%)	0.04 (0.3%)	15.4 (100%)
tons	1.2 (53%)	0.4 (16%)	0.7 (31%)	2.3 (100%)
Minnesota				
acres	13.8 (99%)	0.09 (0.7%)	0.05 (0.3%)	14.0 (100%)
tons	1.3 (55%)	0.4 (15%)	0.7 (31%)	2.5 (100%)
New York				
acres	16.5 (99.6%)	0.04 (0.3%)	0.02 (0.1%)	16.5 (100%)
tons	1.5 (85%)	0.2 (9%)	0.1 (6%)	1.8 (100%)
Ohio				
acres	5.6 (88%)	0.4 (7%)	0.3 (5%)	6.4 (100%)
tons	3.9 (33%)	1.8 (16%)	5.8 (51%)	11.5 (100%)
Pennsylvania				
acres	14.9 (97%)	0.2 (2%)	0.2 (1%)	15.3 (100%)
tons	4.7 (39%)	0.9 (7%)	6.3 (53%)	11.9 (100%)
Wisconsin				
acres	13.1 (98%)	0.1 (1%)	0.1 (1%)	13.4 (100%)
tons	2.2 (40%)	0.6 (12%)	2.7 (49%)	5.5 (100%)
Region Total				
acres	85.7 (97%)	1.2 (1%)	1.1 (1%)	88.0 (100%)
tons	17.0 (33%)	5.2 (10%)	28.7 (56%)	50.9 (100%)

[a] Percentage of state's (region's) total forest land acreage.
[b] Percentage of state's (region's) erosion from forest land.
Percentages may not add to 100 due to rounding.

Source: 1982 National Resources Inventory. USDA-SCS.

TABLE 7

ESTIMATED AVERAGE ANNUAL EROSION (SHEET, RILL & WIND)
IN RELATION TO T, ON OTHER RURAL LANDS*, BY STATE
(millions of acres/tons)

State	Less than T	T to 2T	More than 2T	Totals
Illinois				
acres	0.5 (82%)[a]	0.03 (5%)	0.08 (12%)	0.6 (100%)
tons	0.3 (4%)[b]	0.2 (3%)	5.8 (93%)	6.3 (100%)
Indiana				
acres	0.6 (79%)	0.05 (6%)	0.1 (15%)	0.8 (100%)
tons	0.3 (2%)	0.3 (2%)	14.3 (96%)	14.9 (100%)
Michigan				
acres	2.1 (96%)	0.02 (1%)	0.06 (3%)	2.2 (100%)
tons	0.2 (7%)	0.1 (5%)	2.6 (88%)	3.0 (100%)
Minnesota				
acres	4.1 (98%)	0.02 (1%)	0.05 (1%)	4.2 (100%)
tons	0.2 (11%)	0.09 (5%)	1.5 (84%)	1.8 (100%)
New York				
acres	0.6 (89%)	0.02 (2%)	0.06 (8%)	0.7 (100%)
tons	0.1 (4%)	0.09 (3%)	2.7 (92%)	3.0 (100%)
Ohio				
acres	0.9 (81%)	0.04 (4%)	0.2 (14%)	1.1 (100%)
tons	0.3 (2%)	0.2 (1%)	19.8 (97%)	20.4 (100%)
Pennsylvania				
acres	0.7 (65%)	0.06 (6%)	0.3 (29%)	1.1 (100%)
tons	0.4 (1%)	0.4 (1%)	37.1 (98%)	37.8 (100%)
Wisconsin				
acres	2.4 (97%)	0.03 (1%)	0.04 (2%)	2.4 (100%)
tons	0.2 (8%)	0.2 (6%)	2.6 (87%)	3.0 (100%)
Region Total				
acres	11.9 (91%)	0.3 (2%)	0.9 (7%)	13.0 (100%)
tons	2.0 (2%)	1.5 (2%)	86.4 (96%)	90.0 (100%)

*Includes farmsteads, mines, pits, quarries and other rural lands.

[a] Percentage of state's (region's) total other rural land acreage.
[b] Percentage of state's (region's) erosion from other rural land.
Percentages may not add to 100 due to rounding.

Source: 1982 National Resources Inventory. USDA-SCS.

B. ON-SITE IMPACTS OF SOIL EROSION

The on-site impacts of soil erosion are the damages caused at the site by the wearing away of the soil. Soil erosion damages have long been recognized, particularly in the area of agriculture, but corresponding cost figures are more difficult to obtain. This section will concentrate on the agricultural erosion damages since this is the major source of erosion nationally, and because some cost estimates are available.

AGRICULTURE

The major costs of soil erosion in agriculture include: the loss of the nutrients with the soil, reduced productivity and the potential loss of arable land.

Loss of Nutrients

The monetary value of the nitrogen, phosphorus and potassium that is lost with soil erosion was estimated at $4.00 per ton of eroded soil by the USDA in 1977 (Duda, 1985). More recent communication with USDA staff indicates that $5.00 per ton of eroded soil is the current rule of thumb. The value of the nutrients in the 84 million tons of soil eroded from cropland in Indiana, in 1982, was "conservatively estimated to be around $400 million" (Governor's Soil Resources Study Commission, 1984). This works out to be approximately $4.75 per ton of soil. Based on the current estimate of $5.00 per ton, the value of the lost nutrients for the Great Lakes states are indicated in Table 8.

TABLE 8

VALUE OF NUTRIENTS LOST ANNUALLY IN ERODED SOIL
ON CROPLAND IN GREAT LAKES STATES, BY STATE

State	Amount of Cropland Erosion (millions of tons)	Value of Nutrients (millions of dollars)
Illinois	172.4	862.2
Indiana	84.7	423.4
Michigan	36.3	181.5
Minnesota	147.8	738.8
New York	17.4	87.1
Ohio	49.4	246.9
Pennsylvania	31.2	155.9
Wisconsin	67.4	337.0
Total	606.5*	3,032.6*

* State estimates may not add to this figure due to rounding.

As can be seen above, the value of the nutrients lost due to soil erosion is tremendously large on the regional scale. Even for the individual farmer, the value of the nutrients lost with soil erosion is significant. Take, for example, a farmer with an average sized farm of about 200 acres. If there is severe erosion on this land, e.g. 10 tons/acre/year, that is a total of

2000 tons/year with nutrients valued at $10,000. Even with moderate erosion, e.g. 4 tons/acre/year, the eroded nutrients are worth $4,000.

Reduced Productivity

The extent to which soil erosion reduces productivity is a function of many factors, including the severity of existing eroded conditions, active erosion and deposition during the crop season, the properties of the soil and the adaptive capabilities of the crop. The fact that soil erosion reduces crop productivity has long been recognized. One study in 1949 observed a 34 to 40 percent reduction in the cotton, corn and oat yields on eroded Piedmont soils. More recent studies have found a 40 percent reduction on the Piedmont soils, 42 to 50 percent yield reductions in corn and soybean yields in West Tennessee, and 20 percent reductions in Kentucky (Duda, 1985).

Three different studies in the Midwest are cited in Indiana's Erosion and Sedimentation Situation, 1984. In an Indiana study, yield reductions of 10 to 20 percent were observed on soils with severe erosion, depending on the properties. Results of the Indiana study are indicated in Table 9.

TABLE 9

YIELD REDUCTION FROM SEVERE EROSION ON SIMILAR INDIANA SOILS

Soil Groups by Similar Properties	Reduction in Yield From Severe Erosion
Sloping, deep, porous soils developed on loess, silts and fine sand.	10 percent
Sloping, moderately permeable soils.	15 percent
Sloping, slowly permeable soils with clay subsoils or fragipans.	20 percent

Source: Indiana's Erosion and Sedimentation Situation. Governor's Soil Resources Study Commission, 1984.

An Illinois study found reductions of 5 to 10 percent with moderate erosion and 15 to 25 percent with severe erosion (Governor's Soil Resources Study Commission, 1984).

The third study, done at the Agricultural Engineering Department at the University of Missouri-Columbia in 1971, made an attempt to assign dollar figures to the reductions in yield. A summary of the Missouri findings is shown in Tables 10 and 11.

TABLE 10

EFFECTS OF SEVERITY OF EROSION ON CROP PRODUCTION POTENTIAL

Item	Erosion		
	Slight	Moderate	Severe
Depth of Soil (inches)	12	7	5
Decrease in height of plant during early stages of growth (percent)	--	13	22
Stand at harvest (percent of planting rate)	87	83	76
Corn yield (bu. per acre)	112	96	87
Soybean yield (bu. per acre)	43	29	16

Source: Indiana's Erosion and Sedimentation Situation. Governor's Soil Resources Study Commission, 1984.

TABLE 11

EFFECTS OF SEVERITY OF EROSION ON SUBSEQUENT INCOME DUE TO DIFFERENCE IN PRODUCTION POTENTIAL

Item	Erosion		
	Slight	Moderate	Severe
Difference in production cost (dollars per acre)	--	$1.32	$3.61
Difference in net income (dollars per acre)	--	$18.32	$33.20

Source: Indiana's Erosion and Sedimentation Situation. Governor's Soil Resources Study Commission, 1984.

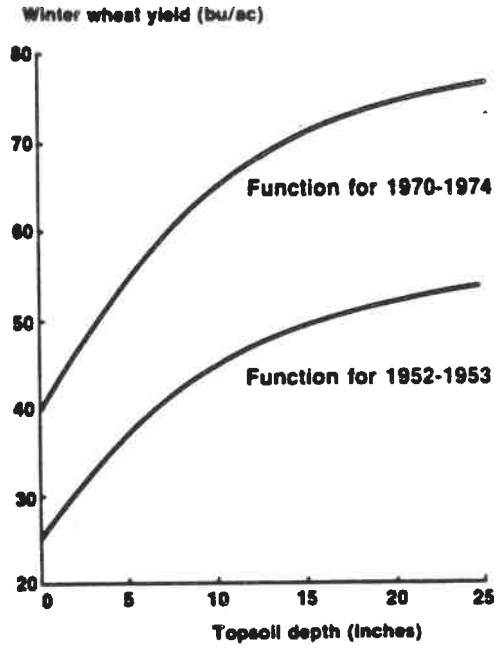
The Indiana Governor's Soil Resource Study Commission reported an estimated loss of $114 million in income to Indiana farmers due to the decreased productivity (Governor's Soil Resource Study Commission, 1984).

PRODUCTION VERSUS PRODUCTIVITY

The dire consequences of soil erosion have been masked by the overall increases in total crop production that have resulted from the great advances in agricultural technology. The increases in production due to improved technology and the increased use of fertilizers and pesticides have, overall, been greater than the decreases in production resulting from soil loss. This can be viewed graphically in Figure 1. The effects of technology are seen by comparing wheat production (in eastern Whitman County, Washington) in the 1970's versus the 1950's. The effects of soil erosion, in both time periods, can be noted by the differences in production with varying soil depths.

FIGURE 1

COMPARISON OF WINTER WHEAT YIELD-TOPSOIL DEPTH RELATIONSHIPS FROM THE 1950'S AND THE 1970'S



Source: Walker, 1986

Loss of Arable Land

The loss of arable land is a result of nutrient loss and reduced productivity. The loss of the nation's agricultural land resources is difficult to measure in economic terms, but it is recognized as very significant.

In the Indiana study, the loss of 84 million tons of soil was equated to losing the plowlayer (top 7 inches) on 85 million acres. This would, on the average, reduce the value of the property by 20 percent. This is the equivalent of a property value loss of about $50 million (Governor's Soil Resource Study Commission, 1984).

DISCUSSION

Much of the information presented in this section on the on-site impacts of erosion in the Great Lakes is for the states as a whole rather than for the in-basin portions of the States. This is due principally to the fact that data are available for the entire States but little information is available for the Basin portion of States.

Because of this, several key points need to be made. One, is that several of the States most notably Illinois, Indiana and Pennsylvania, are major agricultural states but have relatively small areas (percentage-wise) within the Basin. In addition, the land-use activities within the Basin areas of those States differ greatly from the areas outside the Basin. Principally the in-basin areas of those States are urban vs. rural/agricultural areas lying outside the Basin.

A second point, is that there is no discussion of K values (soil erodibility factor) in this section and only brief mention of the significance of highly erodible lands for areas within the Basin.

In general, the areas within the Basin have deep soils that are eroding at low rates (i.e., T or less). This affects the Basin's ability to participate in the Conservation Reserve Program (taking highly erodible land out of production) established under the Food Security Act of 1985 (see description in "Innovative Programs and Projects" section for further information).

A final point is that while areas within the Basin are not highly erodible they may still be causing water quality problems as a result of their close proximity to streams, harbors and the Great Lakes themselves. This points to a deficiency in current erosion control programs that focus just on erosion rather than on sedimentation and the effects on water quality.

These and other issues will be developed more fully in other sections of the report, particularly in Chapter V, "Emerging Concerns for the Region."

C. OFF-SITE IMPACTS OF EROSION AND SEDIMENTATION IN THE GREAT LAKES

Soil conservation programs have traditionally emphasized the benefits of sustainable agricultural production through soil erosion control. More recently, water quality concerns have led to the development of programs which specifically address the relationship of soil erosion to off-site damages of sedimentation. Soil, eroded by wind and rain, becomes sediment when it reaches a watercourse or waterbody. Physical damages to the water include increased turbidity, which reduces the transmission of sunlight, and changes in water temperature. Sedimentation also causes structural changes to a waterbody. It causes aggradation of streambeds, and eliminates pools and riffles. Other impacts of sedimentation on the water result from the adsorbed pollutants which are transported with the eroded soil. Pollutants from agricultural land areas, for example, include chemical fertilizers, pesticides, and nutrients from plant residue and animal wastes. In 1978, the International Joint Commission, Pollution from Land Use Activities Research Group (PLUARG) reported on the phosphorus and mercury loadings into the Great Lakes. The studies indicate that 35 to 80 percent of the total phosphorus load and over 95 percent of the mercury is associated with sediment. Erosion and sedimentation, however, also occur on streambanks, lakeshores, woodlands, pastureland, constuction sites; wherever unstabilized soil is exposed to wind and rain.

Sedimentation

The sediment delivery rate, i.e. the percent of eroded soil that is delivered to waterways, can vary considerably. The eroded soil from a streambank, for example, is much more likely to be delivered to a body of water than the eroded soil in the middle of a forest. The sediment delivery rate is a function of several conditions, such as proximity of erodible area to the body of water, percentage of field cover and amount of runoff. The amount of runoff is determined by the soil type and rainfall, infiltration capacity, vegetation, and topography of land area. The National Resources Inventory Reports give a comprehensive picture of the soil erosion in the region, but not on the subsequent sedimentation. Existing methods for calculating erosion; such as the Universal Soil Loss Equation, and sediment delivery ratios, need further refinement on the mechanical processes of erosion and sediment transport. As a result, estimates of sedimentation on a regional basis are complicated and often imprecise.

The off-site impacts of erosion and sedimentation are even more difficult to quantify. Sediment is only one of many factors affecting water quality, and certain damages, such as reductions in fish populations or loss of recreational uses of a waterbody, may be caused by a combination of factors. Other relevant data, such as increased maintenance requirements on water pumps and other hydraulic machinery, or increased flood damages due to sediment laden flood waters, are simply not available. In 1985, the Conservation Foundation attempted a comprehensive assessment of the off-site impacts of sedimentation on a national basis. Eroding Soils: The Off-Farm Impacts outlines all of the potential impacts, many of which are relevant to the Great Lakes Basin. The range of numbers presented testifies to the difficulty of making such estimates, but the extent of damages indicates the need to do so.

Recreation

Waterways provide recreational opportunities for boating, swimming, fishing and waterfowl hunting. Sedimentation can cause fish mortality as well as damaging fish habitat; reduce feeding opportunities for waterfowl; impair aesthetic pleasure of recreational water sports, and create hazards for swimming and boating. The sediment creates turbid conditions in the water, reduces heat exchange on the surface of the water, and alters the rate of flow of a watercourse. This causes serious impairment of fish habitats. The sediment can damage spawning areas, and suffocate fish eggs, benthos, and other necessary food organisms. Visual feeding behavior and patterns are altered and angling becomes more difficult. Algal growth is often stimulated by the nutrients carried with the sediments. This increases the biological oygen demand of the water, adversely affecting fish and other aquatic organisms. The decrease in fish populations affects certain species of waterfowl which depend on the fish for food. Fishing and hunting opportunities are thereby reduced. The toxic pesticides ingested by the fish further reduce the populations, and may cause human health concerns.

Swimming and boating are also impaired by excess sedimentation, and the associated growth in algae and other aquatic plants. Boat propellers, rudders and keels can run aground in certain areas on "sand bars" formed by sediment. Suspended sediments can also damage boat machinery. Turbidity and algal growth can make swimming more hazardous, since visibility is reduced. The overall recreational experience is reduced by lowering the aesthetic value of the waterbody.

Attempts to measure the impact of sedimentation on recreational experiences have been difficult. Economists have developed models to to assess consumers' willingness to pay for a change in "environmental services," as related to recreational opportunities. The validity of the models has been limited by the lack of information to consumers on physical relationships determining water quality, pricing and product assumptions, and available consumer trade-offs. Qualitative analyses, however, have proven valuable in indicating a strong level of interest in recreational experiences on waterways, and detrimental affects associated with increased sedimentation and pollution problems.

Municipal and Industrial Use

The affects of sedimentation on municipal and industrial uses are primarily cost increases. The costs of water treatment are increased in three main areas: the cost of chemicals to accelerate settling of sediments, cost of additional filtering time and capacity, and cost of sludge disposal. The difficulty in measuring these impacts is due to the marginality by which standard operating processes are increased. The chemicals used to eliminate sediment are also used to treat water for hardness and total dissolved solids (TDS). Additional usage and maintenance of filtration equipment for increased sediments is difficult to quantify once the capital investment has been incurred. The cost of sludge disposal is increasing due to the presence of toxic chemicals. Disposal sites are regulated to safeguard from environmental and public exposure to the hazardous material. While soil erosion transports hazardous chemicals, the actual contribution and associated treatment costs are difficult to determine.

Before treatment, water is usually contained in a sediment basin to allow the larger solids to settle. Excessive sedimentation reduces the capacity of a sediment basin, increasing costs for new construction or dredging. Municipalities also have reservoirs or storage facilities for holding water reserves. Similarly, sedimentation accelerates the aggradation of these facilities.

Dredging

Excessive sedimentation increases the need to dredge to maintain navigational waterways and to prevent flooding. Costs accrue for the mechanical operation of removing the deposits, and also for proper disposal of toxic contaminated material. An indirect impact is the inconvenience to users of harbors and rivers in which dredging operations are required. Groundings and other delays would result if dredging did not take place, however.

The U.S. Army Corps of Engineers maintains reports on all dredging operations. The total costs would be understated as a representation of dredging costs due to sedimentation. The Corps of Engineers is limited by its budget, such that all areas in need of dredging cannot receive service on a timely basis. Private dredging companies conduct some of the dredging operations. Dock owners, for example, must pay the costs of dredging areas outside the main river channels.

Dredging can also create serious water quality problems. Toxic chemicals from point and nonpoint discharges that have settled to the bottom of harbors are resuspended into the water column during dredging operations. Currently, techniques are available to limit resuspension, but no technique is available to totally contain or capture the suspended pollutants. Policy questions remain whether to dredge harbors and increase the hazard of suspended particles or to leave the contaminated sediment deposits in place.

Sedimentation increases the severity and incidence of flooding in several ways: sedimentation causes aggradation of streambanks, and water more frequently overflows the banks, the presence of suspended sediment further increases the total volume of water, the water/soil mixture is more damaging to property and structures than less turbid water flows. Alluvial soils also damage prime agricultural land, reducing their productivity.

The need for dredging projects for flood control dams, channelization projects, drainage projects, and sediment traps can be attributable to sedimentation. A total cost assessment of the impact of sedimentation on flooding, however, would include a percentage of property damage, reduction in crop productivity, as well as remedial actions.

Water Conveyance Facilities

Roadside ditches, drainage ditches from farm fields, and irrigation canals accumulate sediment that must be removed. Accumulated sediment encourages weed growth, and reduces the efficiency of water transportation. Water on the fields can delay planting and water on roads accelerates deterioration. Reducing the quality of irrigation water with sediment can

also affect crop production. Irrigation water that is recycled and contains sediment leaves a fine film on the leaves of plants and impedes photosynthesis.

Although the potential impacts of soil erosion are numerous, no adequate provision to quantitatively assess the impacts is currently available. Models are being developed to link soil erosion to increased water treatment costs, declines in fish populations and other specific areas. The American Farmland Trust has developed a handbook for calculating the cost of off-site damage by systematically collecting data from all potential users of a waterbody. The case studies sited in this report are located outside of the Great Lakes drainage basin, but the methodology is applicable. The report is titled "The Economics of Soil Erosion." (See reference list at the end of the report.)

The relevance of estimating total impacts to policy makers lies in the targeting of program dollars. Dollars spent for remediation of damages could possibly be better spent in the prevention of soil erosion. The targeting questions are complicated further by the need to link damages of sedimentation to specific sites of soil erosion. If little has been done to link agricultural soil erosion to off-site damages, even less has been done to link off-site damages to soil erosion from urban sites, forestry practices and other areas.

II. FUNDING DISTRIBUTION AND ALLOCATION

INTRODUCTION

One charge to the Soil Erosion and Sedimentation Task Force of the Great Lakes Commission is to examine more fully the magnitude and associated costs of soil erosion and sedimentation in the Great Lakes, and to determine Great Lakes funding allocation in relationship to need. The Great Lakes Soil Erosion and Sedimentation Survey, conducted by the Great Lakes Commission Natural Resource Management Committee in 1983, was the first attempt to review the soil erosion and sedimentation programs in the Great Lakes Basin. In late 1986 and early 1987, another survey was developed and conducted to update and expand the information from the first effort. This survey was designed to look at erosion and sediment control programs and expenditures for those programs.

The attached state summaries provide information on the state budgets for soil erosion projects in the individual states and in the Great Lakes Basin portion of the states. Specifically, these summaries provide the following information based on questions from the survey:

Source of Funds for State's Total Soil Conservation Budget

1. The amounts, by source of funds, for each state's total soil conservation budget in the most recent fiscal year for which information is available, and the long term (1990) projected needs for the state soil conservation budget.

2. The anticipated soil conservation budget for 1990 as compared to the FY 1986 budget (expressed as "about the same," "somewhat larger," "significantly larger," or "lower").

3. Any adjustments to be made in the soil conservation expenditures (i.e. reduction in staff, reduction in programs, cancellation of programs, etc.) if expected allocations do not meet projected needs.

Breakdown of Funding for Soil Erosion/Sedimentation Control Programs

1. The program names and distribution of resources for the soil erosion and sedimentation control related activities in each state.

2. The expenditures for soil erosion/sedimentation control programs for the portion of each state within the Great Lakes Basin.

Distribution of Funds

1. How funds are distributed (criteria used) between different programs and amongst counties (or districts).

Individual surveys were sent to all appropriate agencies within a state. A coordinator was selected to collect and summarize all the survey data to avoid duplication of effort and double counting of information. These state summaries were then forwarded to the Great Lakes Commission staff. The following is a summary of that information. A brief section on federal programs is included since many of the state programs are funded through the federal programs, and many of the state programs have similar structures. For those interested in reviewing individual survey responses, the completed survey forms appear in supporting appendices under separate cover.

To assist the reader, the following terms used to delineate program expenditures are briefly described. Many of the terms and programs are discussed in more detail in the "Innovative Programs and Projects" section of this report.

AGRICULTURAL CONSERVATION PROGRAM (ACP) - is a program to provide federal financial and technical assistance to farmers for the implementation of soil and water conservation practices. Assistance covers the following objectives in coordination with the National Environmental Policy Act and the Resource Conservation Act: soil erosion remediation, water quality improvement, woodland and wildlife protection, and pollution abatement. Established under Title VII of the Soil and Water Domestic Abatement Act of 1935, amended under the Soil Conservation and Domestic Allotment Act of 1973, the Food and Agriculture Act of 1977 and the Appropriations Act of 1979, ACP is administered by the USDA, Agricultural Stabilization and Conservation Service (ASCS).

CLEAN WATER ACT - see WATER QUALITY ACT OF 1987 (P.L. 100-04)

CONSERVATION NEEDS INVENTORY REPORTS - USDA inventories conducted in 1958 and 1967 to establish conservation needs for each county in the country.

CONSERVATION OPERATIONS - is a program of the Soil Conservation Service (SCS) to maintain a base level of staffing to work with individual or groups of landusers and government agencies to plan and design practices to reduce soil erosion and sedimentation, and to improve water quality.

CONSERVATION RESERVE PROGRAM (CRP) - is a federal program to retire marginal farmland from production. USDA pays for a 10 year "rental" of land from landuser plus one-half the cost of planting perennial grass, wildlife planting, windbreaks or trees. The program was established under the 1985 Food Security Act, and administered through the USDA, Agricultural Stabilization and Conservation Service (ASCS). See description in "Innovative Programs and Projects" section for further information.

EMERGENCY CONSERVATION PROGRAM (ECP) - is an emergency relief program which provides funds through the USDA, Agricultural Stabilization and Conservation Service (ASCS), to restore farmland damaged through natural disasters, such as floods, hurricanes, and severe wind erosion. Assistance is for remedial action such as removing debris, providing water conservation measures during periods of severe drought, restoration of irrigation systems and other installations, grading, shaping or releveling farmland.

FARM BILL OF 1985 - see FOOD SECURITY ACT OF 1985

FOOD SECURITY ACT OF 1985 - is federal legislation which contains provisions to disqualify farmers for certain USDA programs if they produce crops on highly erodible lands without an approved conservation plan (Highly Erodible Lands Conservation provision, Title XII, Subtitle B), or if they produce crops on converted wetlands (Wetland Conservation provision, Title XII, Subtitle C). See description in "Innovative Programs and Projects"

section for further information.

FORESTRY INCENTIVES PROGRAM (FIP) - is a federal program designed to maintain an adequate supply of timber as demand begins to exceed the supply. Administered jointly through the USDA, Agricultural Stabilization and Conservation Service (ASCS), and the Forest Service, in cooperation with State forestry agencies, federal and state agencies share costs of tree planting and timber stand improvement of 10 acres or more with private landowners. Maintenance of timber production is the main objective, but wildlife, water conservation, prevention of soil erosion and enhancement of the natural environment are addressed in the program.

NATIONAL RESOURCES INVENTORY - is the program report for the inventory and monitoring mandate of the USDA, Soil Conservation Service (SCS), created through the Resource Conservation Act. National data on status and condition of soil, water and related resources is provided by county. Data is used to categorize land by erosion classes and to direct federal soil and water conservation programs.

RESOURCE CONSERVATION ACT (RCA) - see SOIL AND WATER CONSERVATION ACT OF 1977

RESOURCE CONSERVATION AND DEVELOPMENT (RC&D) - is a program administered by USDA, Soil Conservation Service (SCS), designed to allow groups of counties to work together on common resource problems. Program funding is available for erosion control, flood control, drainage, wildlife, recreation and technical assistance projects. Program received Congressional approval in 1962.

RESOURCE INVENTORY AND MONITORING - is the program title of authority given to the USDA, Soil Conservation Service (SCS) under the Resource Conservation Act of 1977 (P.L. 95-192) for extensive data collection, including data on wind and water erosion, land use, land cover, prime and other important farmland, conservation practices and conservation treatment needs, pastureland and rangeland conditions, wetland areas, critical eroding areas, urban and built-up land. Information is available to individuals, citizen groups and units of government to address issues of development, conservation, energy use, and crop production.

RIVER BASIN SURVEYS - are cooperative studies conducted between the USDA, Soil Conservation Service (SCS) and other federal, state and local agencies, authorized under the broad authority of the Watershed Protection and Flood Prevention Act (P.L. 566). Studies aid in the development of alternative plans for meeting national economic development and environmental quality objectives, as well as specific objectives of the agency requesting the study. Issues covered include nonpoint source pollution, prime farmland preservation, important wetlands preservation, and water conservation. The requesting agency has overall leadership and the SCS provides technical planning assistance.

RURAL ABANDONED MINE PROGRAM - is a federal program authorized by Congress in 1977 to provide technical and financial assistance to landowners who own or control non-federal land or water that has been mined, or affected by mining operations, which were abandoned before August, 1977. The program is administered by USDA, Soil Conservation Service (SCS).

RURAL CLEAN WATER PROGRAM (RCWP) - is a federal program authorized by Congress in 1979, designed to determine the improvement in water quality by voluntary implementation by private landowners of cost-effective, best management practices (BMPs) for sediment and erosion, fertilizer and animal waste problems. USDA, Agricultural Stabilization and Conservation Service (ASCS) authorizes cost-sharing contracts (3-10 years) for information/education projects, technical assistance and financial assistance, on designated critical areas or sources of non-point pollution in the approved project area.

RURAL FORESTRY ASSISTANCE (RFA) - is a cooperative program between federal and State agencies to provide technical assistance to landowners for establishment, management, protection and utilization of forest resources.

SOIL AND WATER CONSERVATION DISTRICT (SWCD) - districts organized locally to plan and implement USDA, Soil Conservation Service (SCS) programs. The districts typically are organized by county, but remain distinct from other county-level units of government. Elected or appointed district boards work with land operators on mutually developed goals for resource information and education, technical assistance, incentive programs, evaluation and operational maintenance. SWCDs were authorized by Congress in Act 297, Section 5 of the Public Acts of 1937, as amended, Section 282.5 of the Compiled Laws of 1948.

SOIL AND WATER RESOURCE CONSERVATION ACT OF 1977 (RCA) (P.L. 95-192) - mandates USDA to appraise soil and water resource conditions and trends every five years. The Secretary of Agriculture is required to develop and periodically update a program for conserving and protecting these recources in cooperation with other federal, state and local agencies. The program report and appraisal are available to the general public. The first RCA appraisal was completed in 1980.

SOIL SURVEYS - a general term for the systematic examination of soils in the field and in laboratories. Soils are described and classified, and areas mapped according to kinds of soil. Surveys are used to determine adaptability of soil for various crops, grasses and trees, and soil behavior under use or treatment for plant production or for other purposes. The Soil Conservation Service (SCS), State Agricultural Experiment Stations, and other federal and state agencies participate in a National Cooperative Soil Survey Program, which forms the basis for a nationwide system for conservation planning.

WATERSHED PROTECTION AND FLOOD PREVENTION ACT OF 1954 (P.L. 83-566) - authorizes USDA to assist local organizations in development of flood protection and land treatment programs in watersheds of less than 250,000 acres. The program can include land treatment, non-structural and structural measures. Its primary objectives for assistance are erosion control, flood prevention, and irrigation or agricultural management, although purposes of recreation, fish and wildlife development, municipal and industrial supply are also considered.

WATER QUALITY ACT OF 1987 (P.L. 100-04) -

Section 104 - officially establishes the Great Lakes National Program Office (GLNPO) within the Environmental Protection Agency (EPA) and describes the responsibilities of the office. The Program Office has these basic duties:

1) developing and implementing plans to carry out U.S. responsibilities under the Great Lakes Water Quality Agreement of 1978;
2) establishing a Great Lakes surveillance network to monitor the water quality of the Great Lakes;
3) oversight of programs for the control of nutrients, phosphates and toxic chemicals in the Great Lakes.

The GLNPO is also responsible for Great Lakes demonstration projects (under Section 108), which in the past have focused on nonpoint sources of pollution. As a result of the new legislation, the focus will also be on inplace pollutants

Section 314 - establishes the "Clean Lakes Program" which makes federal funds available to States for implementation of pollution abatement/water quality programs, conditional upon the State submission of a biennial report on water quality of lakes, beginning April, 1988.

Section 319 - establishes the "Nonpoint Source Management Program" which requires each State to prepare a nonpoint source pollution assessment report and management program. Each program should include best management practices for pollution control, programs to acheive implementation, schedules and requisite laws and federal assistance.

See description in "Innovative Programs and Projects" section for further information.

FEDERAL PROGRAMS

The **USDA, Soil Conservation Service (SCS)** and the **Agricultural Stabilization and Conservation Service (ASCS)** have been the principal federal agencies involved in soil and water conservation. Other federal agencies have involvement, especially the Environmental Protection Agency, through various cooperative programs with multi-purpose objectives.

The major role of the SCS has been providing technical assistance on best management practices for soil conservation, as well as the use of fertilizers and pesticides, and animal waste management. Programs of the SCS are implemented through local soil conservation district offices. Under the Soil and Water Resources Conservation Act of 1977 (RCA), the SCS is also responsible for maintaining a national data base of soil and water conditions, and related resources. The RCA specifies that appraisals be conducted every five years in cooperation with other state and federal agencies. These appraisals, along with SCS soil surveys and land area maps, form the data base for directing the nation's conservation efforts; identifying resource problem areas, analyzing the effectiveness of existing programs, and developing objectives and alternative programs and procedures for implementing them.

The ASCS addresses the financial assistance needs of private landowners. The Agricultural Conservation Program (ACP) is a cost-share program to encourage the implementation of enduring conservation practices. The Rural Clean Water Program (RCWP) provides assistance for the installation of best management practices, particularly in efforts to control critical water quality problems in the area. The Emergency Conservation Program (ECP) provides emergency funds for farmlands severely damaged by natural disasters, such as hurricanes and floods. In cooperation with the Forest Service, the Forestry Incentives Program finances tree planting and timber stand improvement to aid in soil conservation as well as sustainable timber production. Under the Water Bank Program, landowners are given annual payments for conserving and protecting wetlands within their private property. The Conservation Reserve Program, recently authorized under the 1985 Food Security Act, will provide annual payments to landowners as incentive to take highly erodible lands out of production.

Other federal agencies encourage soil conservation activities in cooperation with SCS and the ASCS. The **Department of Interior, Office of Surface Mining**, administers the reclamation of abandoned coal mines, under the Surface Mining Control and Reclamation Act of 1977. The **Department of Transportation, Federal Highway Administration**, grants monies for highway construction, conditional on the implementation of best management practices and maintenance of erosion control standards. The **Farmer's Home Administration** assists participants in watershed protection and other soil conservation and pollution abatement cost-share programs with loans to the individual landowners. The **Army Corps of Engineers** reviews and issues permits for various activities along navigable waterways. The **USDA, Agricultural Experiment Station**, part of the national land grant higher education system, conducts research in related areas, and links its research to the **Cooperative Extension Service**, which provides educational programs to landowners and agricultural associations, at the state and local levels.

The **Environmental Protection Agency** has become involved in soil and water conservation activities through authorizations under the Clean Water Act. Section 314, titled the Clean Lakes Program, provides funds for lake protection and restoration projects, including individual landowner implementation of best management practices. Section 104 of the Water Quality Act of 1987 amended Section 118 of the Clean Water Act, and officially establishes the Great Lakes National Program Office (GLNPO) to specifically support monitoring and surveillance projects in the Great Lakes. Section 108 authorizes demonstration projects in the Great Lakes. Included in the 1987 reauthorization of the Act is the Nonpoint Source Management Program, Section 319, which designates funding to states to further develop and implement nonpoint source management programs.

The following state summaries of program budgets for soil conservation activities indicate a dependence on federal appropriations for financing ongoing activities. Anticipating appropriations for 1990, erosion control administrators predict that federal funding is not likely to increase significantly from present levels. Given the strong provisions in the Water Quality Act of 1987, federal funding is likely to be reallocated to address water quality programs over on-site soil conservation projects. Current, needed, and expected budgets for soil conservation in the Great Lakes States are discussed below.

Illinois

The Soil Conservation Program Survey was sent to the following agencies: Illinois Department of Agriculture (IDOA), Division of Natural Resources; Illinois Department of Conservation (IDOC), Division of Forestry; Illinois Department of Transportation (IDOT), Division of Water Resources; Illinois Environmental Protection Agency (IEPA); U.S. Army Corps of Engineers (Corps); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS); University of Illinois, Agricultural Experiment Station (AES); University of Illinois, Cooperative Extension Service (CES). A state summary of all respondents was completed by IDOA. The Corps and IDOT responded that their programs were not applicable to the survey.

The FY 1986 budget for soil conservation activities in Illinois totalled $32,133,163.* Of this, the federal share was $20,095,626, the State share was $11,250,317 and the local share was $787,220. Projected needs for 1990 (long term) total $54,987,239,** with a federal share of $36,192,932, a State share of $17,449,307, and a local share of $1,345,000. Of the state agencies receiving federal funds, three anticipated that the soil conservation budget for 1990 will be "about the same" as the 1986 budget, one anticipated a "somewhat larger" budget ("significantly larger" if Clean Water Act funds for nonpoint source problems are appropriated) and one anticipated a "lower" budget. Of those agencies receiving state funds, one anticipated the 1990 budget to be "about the same" as the 1986 budget, three anticipated a "somewhat larger" budget and one anticipated a "lower" budget. Of those agencies receiving local funds, two anticipated the 1990 budget to be "about the same" as the 1986 budget, and one anticipated a "lower" budget. All cost figures apply to programs in the entire State of Illinois.

An estimated $3000, or .01 percent of the FY 1986 budget can be attributed to the Great Lakes Basin portion of Illinois. The two counties in the Great Lakes Basin watershed, Cook and Lake counties, are highly urbanized, and soil conservation activities exist only to the extent that the land is made suitable for development purposes.

The funds under the FY 1986 allocation were distributed through the following programs:

The **Illinois Department of Agriculture (IDOA)** had program costs of $8,202,500. Funds were distributed to address soil erosion complaints, grants to Soil and Water Conservation Districts (SWCDs) for related operating expenses, IDOA staff administration of SWCDs, soil surveys, and cost-share programs for the construction of conservation practices. The Conservation Practices Program (CPP) and the Watershed Land Treatment Program (WLTP) provide cost-share monies for the construction of soil saving practices on land exceeding the tolerable soil loss. The WLTP is for treatment within a defined watershed or hydrological unit. The CPP may be used to cost-share projects anywhere within the soil conservation district. These programs are similar to the Agricultural Conservation Program and Watershed Protection (P.L. 566) programs at the federal level. Distributional decisions for soil erosion complaints were based on the

number of complaints and economy of treatment. The criteria for determining grants to SWCDs included the number of employees, a base allocation, and the accomplishments within the District. The criteria for cost-share programs in the CPP was the percentage of eroding farmland. An application process was used for determining funding of WLTP projects, and soil surveys were funded based on one-fourth the annual cost of ongoing surveys. Overall, if projected needs for 1990 are not met by future allocations, programs will be reduced or eliminated at both the State and SWCD level.

The **Illinois Department of Conservation (IDOC)** had program costs of $1,267,239. Funds were allocated to programs under the Illinois Forestry Development Act (IFDA), established to provide cost-sharing with landowners to implement silvicultural practices in accordance with an approved management plan, and Rural Forestry Assistance, a cooperative federal/state technical assistance program; and projects under the Forestry Incentives Program (FIP), and Agricultural Conservation Program (ACP). Rural Community Fire Protection Grants were funded on a cost share basis.

The **Illinois Environmental Protection Agency (IEPA)** had $633,600 dedicated to soil conservation projects. Projects included the Highland Silver Lake monitoring project, 6 Watershed Land Treatment Projects (WLTP), and activities funded under Section 314 of the Clean Water Act. Funds were also expended for areawide contracts and IEPA staff time. Funding decisions were made by Areawide Planning Commissions, after identifying the problems and considering the size of the area, and work to be performed. Funds to The Association of Illinois Soil and Water Conservation Districts and for monitoring projects were distributed based on personnel, size of project area, degree of data required and services needed to complete the projects.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)**, had program costs of $6,305,035, allocated between the Agricultural Conservation Program (ACP) and the Rural Clean Water Program (RCWP). The RCWP received an allocation based on a 10 year program period, which necessitated averaging an annual figure for its 1986 program cost. Funding distributions for ASCS programs were based on the ratio of highly erodible land to state lands and on the past history of allocative use.

The **USDA, Soil Conservation Service (SCS)**, had program costs of $12,464,020. Programs under SCS fall under the following categories: conservation operations, soil surveys, monitoring land inventory, Resource Conservation Act, watershed planning (gathering data) and watershed operations (landowner assistance and construction) under P.L. 566, river basin surveys, resource conservation and development, and rural abandoned mines. Funds were allocated to the counties based on the staff and programs which are active in the county. If SCS program needs are not met by future allocations, SCS will reduce staff and equipment-vehicle purchases.

The **University of Illinois, Agricultural Experiment Station** (AES) had program costs of $1,460,769, for FY 1985. It had 22 projects under the soil and land use program, 9 projects under the water and watersheds program, 12 projects under the environmental quality program and 6 projects under the forest watersheds, soils and pollution program. Research projects were approved by a review committee with funds allocated through departments in the College of Agriculture. Currently, little of

the research applies specifically to the Great Lakes Basin portion of the state.

The **University of Illinois, Cooperative Extension Service** (CES) had $1,800,000 for educational programs. Distribution of funds between programs was determined by the priority of issues. Distribution of funds between counties was determined by a staffing plan based on population, number of farms, number of youth and level of local support.

The total program costs for these seven agencies in Illinois was $32,133,163. The actual FY 1986 allocation was $32,133,163. The information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers)		Program Costs (dollars)	
	State	Basin	State	Basin
IDOA	276.0	----	$ 8,202,500	----
IDOC	25.1	----	1,267,239	----
IEPA	8.9	----	633,600	----
ASCS	10.64	----	6,305,035*	----
SCS	337.0	----	12,464,020	----
AES	60.0	----	1,460,769	----
CES	50.0	----	1,800,000	----
STATE TOTAL	767.14	----	$ 32,133,163	$ 3,000**

* average annual ** estimated

Summary

In fiscal year 1986, the federal share of the program costs for conservation activities was 62.5 percent. State program costs were 35.0 percent and local costs were 2.5 percent of the total program budget.

Projected program needs for 1990 (long term) represent a 58.4 percent increase over FY 1986 budgets. To meet this projected

increase, FY 1986 funding levels will need to increase 55.2 percent for federal, 26.1 percent for state and 26.7 percent for local support.

The federal share of the projected 1990 program needs will increase to 65.8 percent of the total. The State's share will decline to 31.7 percent of the total and the local share will remain at 2.5 percent of the total.

These figures indicate very clearly that soil conservation activities are heavily dependent upon federal funding and will continue to be so, to an even greater degree.

* The FY 1986 allocation for IDOC was assumed to be the same figure as the total program cost figure for 1986.

** Projected needs for 1990 for IDOC and CES were maintained at FY 1986 appropriation levels since alternative estimates were not provided.

Indiana

The Soil Conservation Program Survey was sent to the following agencies: Indiana Department of Environmental Management (IDEM); Indiana Department of Natural Resources (IDNR), Division of Soil Conservation; Purdue University, Cooperative Extension Service (CES); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS). A State summary of all respondents was completed by IDNR.

The total FY 1986 budget for soil conservation activities in the State was $18,224,993, of which the federal government assumed $16,163,737, the state government, $808,602, and the local government, $1,252,654. Projected needs for 1990 (long term) are $36,287,677. The federal government's share would be maintained at $16,163,737, the state government's share increase to $18,623,940, and the local government share's increase to $1,500,000. The three agencies receiving federal funds anticipated the soil conservation budget for 1990 to be "about the same" as the FY 1986 budget. For the two agencies receiving state funds, one anticipated a "somewhat larger" budget, and the other anticipated a "significantly larger" budget. The agency receiving local funds anticipated a "somewhat larger" budget for 1990.

The funds under the FY 1986 allocation will be distributed through the following agencies:

The **Indiana Department of Environmental Management (IDEM)** conducted a program in water quality, which had program costs of $40,000 for FY 1986. Program costs attributable to the Great Lakes Basin portion of the state were $4,000.

The **Indiana Department of Natural Resources (IDNR)** soil conservation programs, administered under the Soil Conservation Board, included State grants, soil surveys and general administration. Total program costs for the state were $768,602, of which $76,860 apply to the Great Lakes portion of the state. County funds of $1,252,654 were applied to the administration of the Soil and Water Conservation Districts (SWCD) in the state, $125,266 within the Great Lakes Basin portion. Funding was prioritized for acres of cropland with soil loss of 2T (6-10 tons/acre), or greater.

The **Cooperative Extension Service (CES)** attributed $617,240 to educational programs related to soil conservation statewide. Program costs of $61,724 applied to work within the Great Lakes Basin.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)** had $4,976,000 to administer the Agricultural Conservation Program (ACP). Distribution of these funds was based on conservation needs. The program had an allocation of $497,600 in the Great Lakes Basin portion of the state.

The **USDA, Soil Conservation Service (SCS)** conducted several programs with a total cost of $10,570,497. The programs included conservation operations, soil surveys, river basin surveys, small watershed projects and resource

conservation and development. Funding for programs was prioritized for those lands considered highly erodible. Only personnel costs of $895,429, relating to conservation operations, soil surveys and river basin surveys applied to the Great Lakes portion of the state.

The total program costs in the state for these five agencies, including the local government, was $18,224,993, and the actual FY 1986 allocation was $18,224,993. The total program costs within the Great Lakes Basin were $1,660,879. The cost information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers) State	Basin	Program Costs (dollars) State	Basin
IDEM	1.0	.1	$ 40,000	$ 4,000
IDNR	15.5	1.5	768,602	76,860
County	100.0	10.0	1,252,654	125,266
CES	10.1	1.0	617,240	61,724
ASCS	49.0	4.9	4,976,000	497,600
SCS	278.0	26.3	10,570,497	895,429
STATE TOTAL	453.5	43.8	$ 18,224,993	$ 1,660,879

Summary

Counties project their needs to increase 16.5 percent by 1990 while federal needs are projected to remain at current levels. The greatest need for increased funding exists at the state level. Fiscal 1986 funds are only 4.3 percent of projected needs.

The new cigarette tax fund referred to in Section IV should raise about $3.7 million annually to start the "T by 2000" soil conservation statewide effort. The significant state needs are based on recommendations of the Governor's Soil Resources Study Commission, which resulted in enabling legislation and the "T by 2000" objective.

Michigan

The Soil Conservation Program Survey was sent to the following agencies: Michigan Department of Agriculture (MDA), Environmental Division; Michigan Department of Natural Resources (MDNR), Land and Water Management Division; Michigan State University, Cooperative Extension Service (CES); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS).

The total FY 1986 allocation for soil conservation activities in the state was $26,519,394, of which the federal government contributed $16,979,894, the state government, $5,539,500 and the local government, an estimated $4,000,000. Projected needs for 1990 (long term) are $34,696,400. The federal share should be $22,800,000, the state share should be $8,896,400 and the local share should be $3,000,000. Two of the respondents receiving federal dollars expected a "lower" and "about the same" soil conservation budget in 1990 compared to the 1986 budget. The two agencies receiving state funds expected alternately a "significantly larger" and a "lower" budget in 1990. One agency did not respond to this question. The entire State of Michigan lies within the Great Lakes Basin, so all figures pertaining to state program costs pertain to program costs within the Great Lakes Basin.

The funds in FY 1986 were made available as follows:

The **Michigan Department of Agriculture (MDA)** had total program costs of $5,179,700, which included administration, soil surveys, general and special watershed grants to soil conservation districts, Michigan Technological University research grant, data collection grant, State Soil Conservation Committee, and Michigan Youth Corps Program. MDA's current programs are not adequately funded, as expected allocations do not cover projected needs.

The **Michigan Department of Natural Resources (MDNR)** allocated $53,800 to soil conservation activities through administration, training and enforcement.

The **Michigan State University, Cooperative Extension Service (CES)** had program costs of $306,000, which included conservation tillage, water quality and education programs. Assuming expected allocations will not meet projected needs, CES will redirect its programs to meet priority needs.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)** had a program costs of $8,425,277. ASCS plans to limit its expenditures to highest priority conservation needs if its projected needs are not met.

The **USDA, Soil Conservation Service (SCS)**'s programs included general conservation operations, PL-566 small watershed projects, resource conservation and development, river basin programs and soil surveys with a cost of $8,554,600. Expected allocations for 1990 will not meet projected needs. Smaller programs and staff reductions will result, and the programs will concentrate on high priority work.

The total program costs are $26,519,394. The actual FY 1986 allocation is $20,052,294. The information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers) State	Basin	Program Costs (dollars) State	Basin
MDA	519.0	519.0	$ 5,179,700	$ 5,179,700
MDNR	1.0	1.0	53,800	53,800
CES	6.0	6.0	306,000	306,000
ASCS	68.0	68.0	8,425,277	8,425,277
SCS	207.0	207.0	8,554,617	8,554,617
Local*	200.0	200.0	4,000,000	4,000,000
STATE TOTAL	1001.0	1001.0	$ 26,519,394	$ 26,519,394

* Includes soil conservation districts, county and other locally-generated funds.

Summary

Funding is inadequate at local, state and federal levels to do a satisfactory job of providing information, education, technical assistance and financial assistance programs for erosion and sedimentation control in the Great Lakes drainage area.

Minnesota

The Soil Conservation Program Survey was sent to the following agencies: Minnesota Department of Agriculture (MDOA); Minnesota Department of Natural Resources (MDNR), Division of Waters; Minnesota Department of Transportation (MDOT); Minnesota Pollution Control Agency (MPCA); Minnesota State Planning Agency (MSPA); Minnesota Water Resources Board (MWRB); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS); University of Minnesota, Minnesota Extension Service. Information was received from MDOA, MPCA, ASCS, and SCS. The other agencies either had no response or their programs were not directly related to erosion control. The surveys were collected and summarized by the MDNR.

The total FY 1986 budget for soil conservation activities in the state was $38,700,000, of which the federal government provided $18,500,000, the state government, $15,300,000, and the local government $4,900,000. Projected needs for 1990 (long term) are $110,000,000. The federal government would contribute $80,000,000, the state government, $20,000,000, and the local government, $10,000,000. The agencies receiving federal funds anticipated a "lower" budget for 1990 than for FY 1986. State funds will be "somewhat larger" and local funds will be "somewhat larger" as well.

The funds under the FY 1986 allocation were distributed through the following agencies.

The Minnesota Department of Agriculture (MDOA) allocated funds to technical, education and demonstration projects; shoreland, lakeshore and roadside projects; administration of water permits; the Reinvest in Minnesota (RIM) program, which encourages the retirement of highly erodible farmlands; the Legislative Commission on Minnesota Resources (LCMR) Grant; a structural flood control program; special projects; in-kind services and matching funds (LCMR); cost-share programs; general services; and administration. The total program costs in the state for MDA were $13,900,000. Programs in the Great Lakes Basin portion of the state were administered through the Carlton, Cook, Lake, North St Louis, and South St. Louis Soil and Water Conservation Districts (SWCDs). Programs covered included technical, education and demonstration projects; the RIM program; administration of water permits; special projects; cost share programs; and general services. The costs for programs in the Great Lakes Basin portion of the state totalled $85,000.

The Minnesota Pollution Control Agency (MPCA) allocated $2,400,000 to soil conservation activities in the state under nonpoint source development, nonpoint source implementation and Clean Lakes grants programs. None of the funds were expended in the Great Lakes Basin portion of the state, however.

The USDA, Agricultural Stabilization and Conservation Service (ASCS) administered the ACP, with $3,890,000 spent in the entire state, and $112,486 spent in the Great Lakes Basin.

The **USDA, Soil Conservation Service (SCS)** had total program costs of $14,020,000 for the state, and $247,700 within the Basin. Programs within the entire state included conservation operations, soil surveys, land inventory monitoring, Resource Conservation Act related activities, resource conservation, watershed planning, river basin planning, and watershed operations. Those conducted in the Great Lakes Basin included conservation operations, soil surveys, land inventory monitoring, and resource conservation and development.

The total program cost for these four agencies was $34,210,000, within the entire State, and $445,186 within the Great Lakes Basin. The FY 1986 allocation for the State was $38,700,000. The program information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers)		Program Costs (dollars)	
	State	Basin	State	Basin
MDOA	253.0	7.0	$ 13,900,000	$ 85,000
MPCA	13.0	----	2,400,000	----
ASCS	6.6	.19	3,890,000	112,486
SCS	275.0	6.26	14,020,000	247,700
STATE TOTAL	547.6	13.45	$ 34,210,000	$ 445,186

Summary

Program funds available for FY 86 fall substantially short of projected funding needs for the State as a whole and the portion tributary to the Great Lakes. The state contribution to programs is substantial, approaching the federal level, and is anticipated to increase slightly in the near future.

If projected needs are to be met, the most substantial increase is expected to occur in the federal contribution. Figures projected here would indicate the need for a four-fold increase in federal dollars. This information ignores the substantial federal contributions currently being made under the CRP, which will significantly alter total land treatment costs. Due to the ongoing implementation of this program it is difficult to assess the overall impact on program needs.

Finally, it is clear that local units of government, primarily counties and municipalities, will be expected to make increasing contributions to erosion and sediment control efforts. Although local government budgets are

currently under increasing demands from a variety of programs, investments in erosion and sediment control may offer a unique opportunity to reduced expenditures in other program areas such as maintenance of roads, ditches, and storm sewers.

New York

The Soil Conservation Program Survey was sent to the following agencies: Cornell University, Cooperative Extension Service (CES); New York Department of Agriculture and Markets (DAM), Division of Rural Affairs; New York Department of Environmental Conservation (DEC), Division of Water; New York Soil and Water Conservation Committee (SWCC); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS). This summary includes the responses from CES, ASCS and SCS.

The FY 1986 budget for soil conservation activities for the two agencies in New York was $16,543,475. The federal government provided $15,908,725 in funds, and the state government provided $634,750. Projected needs for 1990 (long term) are $46,245,350. The federal government share would be $38,311,000 and the state government share would be $7,934,350. The CES anticipates both its federal and state funded budgets for 1990 to be "somewhat larger" than its FY 1986 budget. The ASCS anticipates its federal program budget for ACP to be "lower", and "about the same" for CRP in 1990 than the FY 1986 budget. The SCS anticipates a "significantly larger" federal budget in 1990 than the FY 1986 budget.

The funding under the FY 1986 allocation was administered to the following programs:

The **Cornell University, Cooperative Extension Service (CES)** has program costs of $283,800 Statewide, and $105,000 within the Great Lakes Basin portion of the state. Those programs related to soil conservation include the Sea Grant Extension Coastal Erosion Program, and soil surveys.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)** administers the Agricultural Conservation Program (ACP). The actual program costs for FY 1986 are not known since most of the cost-share funds were unavailable until the fourth quarter. Approximately $2,700,000 of cost-shares were earned and paid to participating farmers as of September 30, 1986. Other program costs, personnel costs and staff numbers are also unattainable due to the large number of USDA programs administered by ASCS. The funds for ACP are distributed according to a state formula which incorporates estimated technical services, long-term agreements, previous years earnings, and conditions for program implementation.

The **USDA, Soil Conservation Service (SCS)** has statewide program costs of $9,985,925 for its programs in conservation operations, soil surveys, resource inventory and monitoring, resource appraisal, plant materials operations, resource conservation and development, river basin studies, watershed operations and watershed planning. All of the above programs are also administered in the Great Lakes portion of the state except the river basin and watershed planning programs. Program costs within the Great Lakes Basin portion of the state total $3,458,118. Funding distributions are made between technical and financial assistance. The criteria for technical assistance is based on a workload analysis. Financial assistance funds must be approved for distribution by councils, program managers and steering committees based on project activity.

The available information on programs in New York is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers) State	Basin	Program Costs (dollars) State	Basin
CES	4.1	1.3	2,283,800	105,500
ASCS	____	____	2,700,000*	____
SCS	240.8	63.5	9,985,925	3,458,118
STATE TOTAL	244.9	64.8	12,979,725	3,563,618

* as of September 30, 1986

Summary

The long term (1990) needs for the ACP and CRP are estimated to be $23 million and $4.9 million, respectively.

It is not anticipated that additional federal/state funding will be available to meet these projected needs. In fact, it is anticipated that ACP funding in 1990 will be somewhat lower than the 1986 level.

The USDA, Soil Conservation Service costs are projected to rise to $10,250,000 by 1990, due to the 1985 Food Security Act provisions for sodbuster, swampbuster and conservation compliance which will require an increase in staff and conservation applications to highly erodible lands.

Given static funding sources, it is unlikely the New York State will be able to significantly expand efforts in soil and erosion control in the Great Lakes Basin.

Ohio

The Soil Conservation Program Survey was sent to the following agencies: Ohio Department of Natural Resources (ODNR), Division of Soil and Water Conservation; Ohio Environmental Protection Agency (OEPA); Ohio State University, Cooperative Extension Service (CES); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS). The CES had no response.

The total FY 1986 budget for soil conservation activities in the state was $19,196,526, of which the federal government share was $11,194,750, the state share was $4,839,034, and the local share was $3,162,742. Projected needs for 1990 (long term) are $31,107,603. The federal government share of this total would be $20,950,000, the state share, $6,657,603 and the local share, $3,500,000. Three of the four agencies receiving federal funds anticipated a "significantly larger" budget for 1990 than FY 1986. One agency did not respond to that question. The agency receiving state funds anticipated a "lower" budget, and the agency receiving local funds anticipated a "significantly larger" budget for 1990.

The funds under the FY 1986 allocation were distributed through the following agencies:

The **Ohio Department of Natural Resources (ODNR)** had program costs of $7,395,000, allocated to soil and water conservation districts, district operations and support, soil surveys and agricultural pollution abatement programs. Distributional determinations are made based on the amount of county appropriations, problem identification, and willingness of landowners to participate. Expenditures in the Great Lakes portion of the state were $2,716,500, which includes county SWCD funds. If projected needs are unmet, ODNR will not expand its cost sharing or SWCD programs.

The **Ohio Environmental Protection Agency (OEPA)** had $155,000 for water quality management/nonpoint source pollution control programs. A portion of the budget was allocated to local planning agencies for programs in education, demonstration and planning projects aimed at water quality improvement by reducing sedimentation. Funds were distributed based on expected water quality improvements by nonpoint source controls. If expected allocations do not meet projected needs, the OEPA will move personnel to high priority projects and reduce the number of contracts with the local planning agencies.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)** administers the Agricultural Conservation Program (ACP), with a program budget of $6,110,000. Participation in ACP is determined based on the Needs Inventory Reports (1971) and the 1982 Natural Resources Inventory (NRI). Approximately 35 percent of the ACP budget was administered in the Great Lakes Basin portion of the state. If expected allocations are below projected needs, ASCS would expect a "reduction in force" like that experienced in 1973.

The **USDA, Soil Conservation Service (SCS)** had program costs of

$7,190,380 for FY 1986. The conservation operations program had the largest allocation. Other programs included the watershed project (P.L. 566) at East Branch Sugar Creek, a special project at Lost Creek and a 65 county wide study in watershed planning. The Lost Creek study and a portion of the watershed planning study, as well as conservation operations occur in the Great Lakes Basin portion of the state. Expenditures within the Basin total $2,180,976. By anticipating unmet projected needs, the SCS plans to "target personnel" in districts which have large numbers of highly erodable acres and a conservation compliance workload. However, to the extent resources permit, at least one SCS staff person will be maintained at each district office as part of the ongoing SCS conservation operations program.

The total program cost for these four agencies within the entire state was $20,850,380. The program cost for the Great Lakes Basin was $7,035,976. FY 1986 allocations for the entire state were $18,996,526. The information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers) State	Basin	Program Costs (dollars) State	Basin
ODNR (SWCDs)	302.0	---	$ 7,395,000	$ 2,716,500
OEPA	1.3	---	155,000	---
ASCS	47.0	---	6,110,000	2,138,500
OSCS	212.5	---	7,190,380	2,180,976
TOTAL	562.8	---	$ 20,850,380	$ 7,035,976

Summary

In Ohio, federal funding comprises the major portion of conservation program support. Over 70 percent of all conservation program funds are derived from USDA. Since 1982, state expenditures have risen sharply; however, federal funding has decreased while local appropriations have increased only marginally. In looking to the years ahead, significant issues confront erosion control programs in Ohio.

It is doubtful increases in state support will keep pace with anticipated declines in federal funding. Although federal program managers in Ohio 'expect' program increases, national policies indicate declining federal support for soil conservation. Static or declining revenues come at a time when the 1985 Farm Bill places greater burdens on county SCS and SWCD personnel to prepare farm plans. The close working relationship between SCS

and SWCD staff in each county results in a situation where national initiatives (Farm Bill) inevitably push aside local priorities such as conservation, education, livestock waste management, etc.

Without substantial funding increases, it will be very difficult for SWCDs in Ohio to maintain basic services to landowners. SWCDs in less erosion prone areas, like the Lake Erie Basin, will likely see their federal support decline at a more rapid rate due to the shift of staff to other counties.

In the past, little funding for sedimentation reduction has come from environmental programs in Ohio. The Water Quality Act (P.L. 100-4) may change this due to the availability of implementation grants for nonpoint source control (authorized by Section 319). Unlike ASCS and SCS program allocations, future environmental funding for demonstration projects to reduce erosion will be targeted to critical watersheds. This should improve water quality of affected streams and impoundments. However, new nonpoint pollution control programs will have to be closely coordinated with Farm Bill responsibilities in order for SCS and SWCDs to cope with additional workloads.

A major issue will be whether Congress will appropriate significant funding under Section 319 (of P.L. 100-4), which then could be used to reduce sedimentation in Lake Erie. With declining USDA funding, Clean Water Act funds could become the main support for watershed management projects affecting the Great Lakes.

Pennsylvania

The Soil Conservation Program Survey was sent to the following agencies: Pennsylvania Department of Environmental Resources (PA-DER), Bureau of Soil and Water Conservation; Pennsylvania State University, Cooperative Extension Service (CES); USDA, Farmer's Home Administration (FmHA); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS). The CES and the FmHA were unable to provide information on their budgets specific to soil conservation activities. The CES further responded that its educational programs, although related to water and soil erosion, were not applicable to the survey.

The total FY 1986 budget for soil conservation activities in the state was $30,262,574, of which the federal share was $25,144,861, the state share was $2,367,713, and the local share was $2,750,000. Projected needs for 1990 (long term) are $42,454,154. The federal government will provide $32,270,736, the state government, $5,683,418, and the local government, $4,500,000. Of the agencies receiving federal funds, two anticipated the soil conservation budget for 1990 to be "somewhat larger" than the FY 1986 budget, and one anticipates it would be "lower." The State funded agency anticipated a "somewhat larger" budget for 1990, and the locally funded agency anticipated a "significantly larger" budget for 1990 over its FY 1986 budget.

The funds under the FY 1986 allocation were distributed through the following agencies:

The **Pennsylvania Department of Environmental Resources (PA-DER)** had program costs of $1,953,000 for state erosion and sedimentation control programs, and grants to conservation districts. Allocations to the Great Lakes Basin portion of the state totalled $29,591.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)**, had $1,765,000 which it divided between state level programs (Agricultural Conservation Program (ACP), Forestry Incentives Program (FIP)), and county programs. ASCS spends $110,000 annually for ACP, FIP administration and a cost-share program in the Great Lakes portion of the state. Conservation needs are determined through a state-county inventory and other factors, such as farm population, economic ability for cost-sharing, and level of interest in the program. If expected allocations do not meet projected needs in the future, the program cost-sharing with farmers will be reduced.

The **USDA, Soil Conservation Service (SCS)**, supported numerous programs with a total cost of $8,198,000. The following were SCS programs: conservation operations, soil surveys, river basin surveys, watershed operations, watershed planning, resource conservation and development, inventory & monitoring and rural abandoned mine reclamation. Programs within the Great Lakes Basin portion of the state included conservation operations and resource conservation and development, totalling $68,000 in costs. SCS funds were distributed according to demographic information, workload analysis and program activities.

The total program cost within the entire state for these four agencies was $11,916,000. In the Great Lakes portion of the state, the program costs were $207,591. The cost information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers) State	Basin	Program Costs (dollars) State	Basin
PA-DER	21.0	.33	$ 1,953,000	$ 29,591
ASCS	42.0	.40	1,765,000	110,000
SCS	233.0	2.0	8,198,000	68,000
STATE TOTAL	476.0	22.73	$ 11,916,000	$ 207,591

Summary

Numerous programs are supported by the USDA, SCS. An ongoing program of technical support is resulting in highly erodible land being treated. The 1985 Farm Bill will have a big impact on highly erodible land by 1995. Some of the more erodible land has been enrolled in the Conservation Reserve Program (CRP). Other non-cropland acres are receiving treatment through the resource conservation and development program.

The Agricultural Conservation Program (ACP) is the major ASCS financial contributor through cost-sharing with farmers to implement soil erosion and water quality improvement practices on farmland. The CRP may remove a relatively small acreage from agricultural production for up to ten years. This land is maintained in conservation cover. The Forestry Incentive Program (FIP) may cause trees to be planted on a small amount of farmland, thus changing the land use.

The ASCS estimate of $110,000 annually will be used by the above programs in the Great Lakes drainage area of Pennsylvania. Annual Production Adjustment Programs may retire additional acreage from grain crops on an annual basis subject to federal legislation in effect in any given year. Land retired from production is maintained in a conservation cover.

The Commonwealth of Pennsylvania will attempt to accelerate its ongoing program efforts to reduce sediment loadings to Lake Erie. Currently, the Erie and Crawford Conservation Districts have assisted the Pennsylvania Department of Environmental Resources (DER) in the implementation of the state's Erosion and Sedimentation Control Program. DER field assistance is

available over a ten-county area to assist the districts in program monitoring and compliance.

Potential funding from Section 319 of the re-authorized Clean Water Act may provide resources needed to carry out the phosphorus reduction program developed as part of the overall United States Plan adopted pursuant to the Great Lakes Water Quality Agreement of 1978.

Matching funds will be requested from the State Legislature to support eligibility for federal grant funds. It is hoped that a sustained program can be established to allow Pennsylvania to meet its commitment to reduce annual phosphorus loading by 15 metric tons.

This plan would provide an additional technician to the Erie Conservation District to review erosion control plans, to monitor construction activities, and to assist DER in compliance and enforcement.

Wisconsin

The Soil Conservation Program Survey was sent to the following agencies: University of Wisconsin, Cooperative Extension Service (CES); USDA, Agricultural Stabilization and Conservation Service (ASCS); USDA, Soil Conservation Service (SCS); Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), Bureau of Land Resources; Wisconsin Department of Natural Resources (WDNR). The surveys were collected and summarized by DATCP.

The total FY 1986 budget for soil conservation activities in the state was $71,361,438, of which the federal government contributed $58,848,538, the state government contributed $8,686,900, and the local government contributed $3,826,000. Projected needs for 1990 (long term) are $81,664,000. The federal government's share would be $59,864,000, the state government's share would be $16,100,000, and the local government's share would be $5,700,000. The soil conservation budgets for 1990 are expected to be "about the same" as the FY 1986 budgets for the agencies receiving federal, state and local funds.

The funds under the FY 1986 allocation were distributed through the following agencies.

The **University of Wisconsin, Cooperative Extension Service** expended $380,000 on its educational programs statewide, $152,000 within the Basin.

The **USDA, Agricultural Stabilization and Conservation Service (ASCS)** had program costs of $49,891,173 statewide, $12,472,800 within the Basin. The ASCS administered the Agricultural Conservation Program (ACP), Emergency Conservation Program (ECP), Forestry Incentives Program (FIP), Rural Clean Water Program (RCWP) and the Water Bank Program (WBP).

The **USDA, Soil Conservation Service (SCS)** had program costs of $15,386,478 for the entire state, and $3,371,782 within the Basin. The SCS administered conservation operations, small watershed projects, resource conservation and development, river basin projects, soil surveys and other programs. Of these programs, the conservation operations, resource conservation and development and soil surveys were administered within the Great Lakes Basin.

Program costs for **Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)** were $2,209,500 statewide, $460,000 allocated within the Basin.

Wisconsin Department of Natural Resources had $7,360,000 in soil conservation expenditures statewide, $3,250,000 within the Basin. All of its programs were administered within the following river watersheds: Lower Manitowoc, Root, Kewaunee, Little, Seven Mile, Upper Door, East and West Branch Milwaukee, Menomonee, North Branch Milwaukee, Milwaukee South, and Sheboygan. All of the watersheds are considered within the Great Lakes Basin watershed. The counties expended a total of $7,186,000 on soil conservation activities. Distributional determinations were made based on priority areas and statewide assessments.

The total program cost within the entire state for these five agencies and the counties was $82,413,151. In the Great Lakes portion of the state, total program cost was $19,706,582. FY 1986 allocation totalled $71,361,438 for the entire State. The cost information is summarized in the table below.

STATE EXPENDITURES

Agency	Staff Equivalents (numbers) State	Basin	Program Costs (dollars) State	Basin
CES	5.0	2.0	$ 380,000	$ 152,000
ASCS	37.0	9.0	49,891,173	12,472,800
SCS	208.0	50.0	15,386,478	3,371,782
DATCP	9.0	2.0	2,209,500	460,000
DNR	22.0	6.0	7,360,000	3,250,000
County	131.0	----	7,186,000	----
STATE TOTAL	412.0	69.0	$ 82,413,151	$ 19,706,582

Summary

The soil erosion budget outlook for Wisconsin is generally stable. ASCS funding should be about the same. SCS funding may increase somewhat in the short term as a result of reallocations to accomodate the cross compliance provisions of the 1985 Farm Bill. Longer term funding levels are much less certain. State support for soil erosion was increased by $350,000 annually in the State budget passed July 1, 1987. Further increases are unlikely. Priorities for the state soil erosion program are likely to favor more technical assistance at the expense of cost sharing on projects. Local financial support for erosion control is not expected to increase substantially although counties may be more active in state technical assistance efforts. Federal funding for nonpoint pollution abatement under the Clean Water Act may significantly increase funds available in Wisconsin for soil erosion should those funds be appropriated.

III. ISSUES IN THE APPLICATION OF EROSION CONTROL PRACTICES

A variety of erosion control practices are routinely recommended by state and local resource agencies and installed by landowners though the Great Lakes Basin.

In most cases, these practices have been used for decades with little modification. National standards exist for their design and implementation. Scores of technical specialists exist in each Great Lakes State to help individuals assess the need for erosion control practices and how to install and maintain them.

With the recent emphasis on nonpoint source pollution control and sedimentation, more attention has been focused on the application of erosion control practices. As a result of many years of demonstration and research, resource agencies at all levels of government understand the relationship between erosion control practices and water quality, including which practices are most cost effective in reducing sedimentation.

While most practices have been used for many years, there are some new twists, conservation tillage, for example. Conservation tillage involves leaving as much plant residue from the previous crop on the surface as possible. The residue protects the soil from erosion. Conservation tillage ranges from no till where there is almost no disturbance of the soil to various forms of reduced tillage which often results in as little residue as conventional or moldboard plow tillage. Although conservation tillage techniques have been known for sometime, the advent of a new generation of pesticides (particularly herbicides) has made conservation tillage a viable agricultural production practice.

However, individual erosion control practices are most effective as part of a total resource management system for a unit of land. A resource management system is a combination of conservation measures, land use decisions and management practices that meet the landuser's objectives and reduce erosion. Generally, any given farm may have to employ a variety of erosion control practices. The following briefly describes the type of practices in use throughout the Great Lakes Basin:

WATER EROSION

Most erosion occurs because of water runoff. In water erosion, there is little, if any, opportunity to modify climatic effects, such as erosivity of the rain or runoff from melting snow. And while it is possible to modify slopes to reduce steepness, this is difficult and costly. The factors most amenable to modification through management are slope length, and surface cover.

There are a number of proven methods for controlling water erosion. These methods can be divided into two general categories: (a) those relative to soil management that affect soil cover (vegetative); and (b) those structures specially built to control runoff (structural).

Vegetative Practices

Vegetation has a tremendous influence in reducing erosion; above-ground growth protects the soil from raindrop impact; whereas the root system binds the soil particles together to further resist detachment.

Vegetation also reduces the amount and velocity of runoff. Growing plants remove water from the soil profile, thus increasing the storage capacity of soils for rainfall. They also prevent surface sealing, thereby maintaining high infiltration rates. Both effects lessen the amount of runoff. Runoff velocity is reduced by the presence of plant material at the soil surface.

Examples of vegetative measures are: rotations, cover crops, contour strip cropping, buffer strips, field borders, sod waterways, high plant populations and narrow rows. In addition to the direct effects of crops in reducing soil erosion, they also produce residual effects, such as improving soil tilth.

Crop rotation can also influence erosion rates. Although soybeans produce better tilth than corn, corn residue generally leaves the soil less erodible than soybean residue, smaller grains provide the maximum in soil erosion protection. All crops have some beneficial residue effects compared to conventional tillage.

Crop residues are most effective in reducing soil erosion when left on the surface. Complete residue cover at the soil surface virtually eliminates soil detachment and greatly lessens velocity of runoff and sediment transport capacity. In addition, protective residue mulch prevents surface sealing of soils, thereby maintaining higher infiltration rates and reducing runoff amounts.

Structural Practices

An alternative approach to conserving soil is the use of structural devices. This approach is based primarily on slowing down runoff and protecting areas of concentrated flow. Structural measures are aimed at reducing the amount of sediment runoff and dissipating the erosive energy in channels. Structural measures are best used in support of and in combination with vegetative control measures.

Examples of structural practices include: contouring, diversions, terraces, sediment basins, ponds, and grade stabilization structures. One of the more effective structural measures in reducing sedimentation and delivery of other pollutants is the use of retention ponds. These structures control erosion by channelizing water, and serve as settlement basins for sediment-laden runoff.

WIND EROSION

While the previous discussion focused on erosion produced by water and the practices used for its control, wind erosion plays a major role in the sedimentation problems in several areas of the Great Lakes Basin. Wind

erosion has become more pronounced in recent years due to the consolidation of fields and removal of woodlots and field borders.

As with water erosion, we do not have the means to alter the climatic factors that affect wind erosion, such as wind speed, direction and time of year when highly erosive winds occur. Neither can we significantly control those soil properties like texture that greatly influence the amount of erosion due to wind. On the other hand, we can modify factors affecting wind erosion. These include soil structure, soil surface, roughness, the unsheltered distance across a field, and vegetative cover.

There are four major principles of wind erosion control: (a) establish and maintain vegetation or vegetative residue to protect the soil; (b) reduce field widths across the prevailing wind direction by establishing wind barriers, such as field windbreaks or trap strips at designated intervals to reduce wind velocity and soil avalanching; (c) produce or bring to the soil surface aggregates or clods large enough to resist the wind force by using a chisel or other tillage implement; and (d) roughen or ridge the land surface to reduce wind velocity and stop drifting soil.

Non Cropland Erosion Control Practices

The principles of erosion control described for cropland generally hold for non-cropland. The key to control is to restore or increase the surface cover with growing plants or plant residue. Specific control measures on various non-cropland areas are as follows:

- On pastures, reseed with well-adapted species where cover is thin, and control grazing so that adequate cover is maintained throughout the year.

- On forest and woodlands, use erosion control practices including proper layout of harvest patterns and road construction. Replant clear-cut areas using harvest debris for cover until new trees are established, and keep livestock out of woodlands.

- On strip-mine land, revegetate as soon as practically possible, and shorten long slopes by means of diversions or terraces.

- On highways and roads, mulch and vegetate critical area, and install structures, apply stone, etc., where vegetation alone won't do the job.

- On streambanks, install water management structures (wiers, drop structures, etc.) or apply riprap to protect critical areas; and shape and vegetate streambanks to improve stability.

- On residential and commercial sites, minimize the amount of disturbed area, reseed (revegetate) as soon as possible, and control runoff from site (sediment basins, retention basins).

ISSUES

The adoption of erosion control practices by landowners and farm operators is the primary program objective of federal, state and local soil conservation programs. Because of the impact of sediment on water uses, environmental protection programs are taking an increased interest in erosion control as well. For example, over the last decade U.S. EPA has financed several demonstration projects to reduce sediment delivery to the Great Lakes. However, questions have been raised concerning the willingness of landowners to adopt erosion control practices voluntarily, the cost effectiveness of public support for installing practices on private land, the environmental consequences of certain practices, and the ability of existing conservation agencies to achieve erosion control objectives. The following briefly examines these issues as they relate to agricultural, urban and other types of erosion control practices:

Agricultural

Soil conservation agencies have labored to get land users to install and maintain soil conservation practices for nearly fifty years. While progress reports indicate significant numbers of acres protected and tons of soil saved, many believe erosion to be worse today than during the dust bowl era that gave rise to soil conservation programs. A variety of reasons account for this dilemma, not the least of which is the change in agricultural technology. Continuous cash grain farming, larger and more costly equipment, increased farm tenancy, low costs of manufactured nutrients, and concentration of livestock are some of the factors contributing to more intensive monoagriculture on even larger tracts of land. The "finger in the hole of the dike" represented by conservation agencies, has hardly been equal to the wave of changes which have overtaken the industry.

Convincing land users of the desirability of soil conservation practices that do not have direct and immediate economic returns is a difficult process. Carefully designed and installed structural measures, such as waterways and contour strips, have been plowed under. Windbreaks have been cut down and wetland areas drained to bring more land into production and increase farm income. So far, agriculture has also been protected from the economic consequences of off-site sedimentation and chemical contamination.

In an effort to market conservation practices that are "production neutral" or enhance farm income, conservation programs are promoting conservation tillage. This practice has significant soil loss savings, produces income, and does not require the larger capital outlays associated with structural practices. However, use of conservation tillage generally requires changing equipment and crop management techniques and use of additional herbicides. The agricultural community, already faced with small profit margins and heavy debt loads, has not embraced the new tillage technology, despite the optimistic statistics reported by several organizations. Coupled with slow adoption of conservation tillage in the agricultural sector is the skepticism of the environmental community which is increasingly concerned with applications of agricultural pesticides and herbicides. The reliance by conservation agencies on wide-spread adoption of conservation tillage to achieve erosion control objectives may be a problematic strategy.

The use of more expensive techniques or the mandatory use of erosion control practices by agricultural producers also has its problems. Although the 1985 Farm Bill has introduced conservation compliance for the first time, the ability of local conservation agencies to draft farm plans and monitor their implementation is questionable, given the nonregulatory tradition of these agencies and their small staff sizes. Even if the Farm Bill conservation compliance provisions are met, they only apply to highly erodible acres. In the Lake Erie Basin most sediment originates from cropland eroding at or below "T". In addition, the extent of participation in federal farm programs in the 1990s will be a decisive factor in the effectiveness of conservation provisions. The announced objective of the United States and other developed nations to phase out agricultural production subsidies makes the long-term impact of the Farm Bill on erosion an unknown. The Farm Bill may be more of a groundbreaker in the road to more stringent regulation of agriculture than a solution in itself.

Financing conservation programs is undergoing a dramatic change. Figures reported in Chapter II of this report indicate the majority of support for conservation programs comes from federal agencies. However, states have increased their funding each year, especially in the Great Lakes Basin. In the face of declining federal support, states seem willing to assume much more of the financial burden for cost share and technical assistance programs. As state funding for these programs has increased, concern over cost-effectiveness, maintenance of practices and their targeting to areas of greatest need are surfacing in state assisted programs. Lower cost practices, greater private sharing of costs, off-site benefits, and the mitigation of adverse side effects are facets which state programs are addressing.

Although states are increasing their support for soil conservation programs, the impact of state support may be diminished by losses in both federal and local contributions. In all likelihood, states will have to share an even larger portion of program costs in the future. Conservation compliance and Section 319 requirements, however, are new federal mandates which place the primary burden for implementation on state and local units of government. Clearly, a federal role in sharing the cost of meeting Farm Bill and Clean Water Act objectives is necessary. This will require supplemental appropriations from USDA between 1988 and 1995, continued funding for conservation reserve easements, and full funding of Section 319 over its four year authorization.

No matter what combination of funding evolves, funds will have to support local staff to provide the technical help to install practices and to pay for the practices themselves. Politically, most states will find it very difficult to increase mandatory soil erosion requirements without providing financial incentives. And, although tax incentives/abatements are often more palatable than direct cost share payments, the economic plight of rural school districts and county government in general may eliminate consideration of many indirect financing mechanisms.

Lastly, agricultural erosion control practices should be assessed to determine the relative cost effectiveness of more traditional practices versus others which may have less acceptability, but greater erosion control benefits. For example, windbreaks are not commonly used in the Great Lakes Basin, but large expanses of flat land, removal of field borders and

woodlots, and increased field sizes have contributed to significant wind erosion problems in several areas. Taking riparian land out of production to protect stream banks, reduce sediment delivery and enhance wildlife may be another practice deserving attention. In general, these types of practices may require substantially more public financial support to overcome resistance of landowners and farm operators.

Urban

Urban erosion control has been treated very differently than similar problems in agricultural areas. While agricultural erosion control has a long standing programmatic infrastructure, and practices have been carried out in voluntary ways with public financing, urban erosion control does not have a programmatic history and is viewed as being a totally private responsibility. Unlike agricultural erosion control which has been directed and funded by federal and state agencies, urban erosion is handled almost entirely by local government. Although local programs have been developed to control erosion, the approach has been regulatory with no public financing of practices. Generally, practices are required as part of the local review process for new construction.

At least three points should be raised concerning urban erosion control practices: (1) the major emphasis may not be expanding existing programs (as with agricultural erosion), but creating them or seeing that local agencies which already have enforcement authority for erosion control, exercise that authority; (2) in order to build local programs it may be necessary to provide some public funding of lower cost practices on a demonstration basis; this may necessitate changes in state enabling legislation -- at the very least it may involve changing local, state and federal funding priorities; (3) certain urban erosion control practices may help mitigate other pollutants besides sediment, and/or meet other objectives of the urban community. Such practices should be given higher priority; for example, the National Urban Runoff Program funded by U.S. EPA found that stormwater detention basins, besides reducing channel erosion and trapping entrained sediments, also have high removal efficiencies for a variety of urban pollutants. Also, detention basins may be able to provide multi-use surface waters in areas devoid of such recreational facilities.

Soil conservation agencies may be called upon to devote a greater share of their resources to curbing urban erosion problems; otherwise local public support may dissipate, especially in counties having a large proportion of urban land and population. Since erosion control is central to the mission of soil and water conservation districts (and similar agencies), it may be more important for them to upgrade their technical knowledge of urban practices and give them priority, rather than trying to convince other local agencies (such as engineering offices, etc.) to give erosion control priority when it is tangential to their overall mission.

State soil conservation agencies in the Great Lakes Basin should assess the capabilities of local urban erosion control programs, help enhance them if they are found wanting, and encourage municipalities and local government agencies to become more involved in erosion control programs.

Other

Agricultural and urban land uses are the major sources of erosion. Some other sources of erosion do not fall neatly into these categories, most notably streambank and shoreline erosion. Streams transverse both the urban and rural environments. It appears that streambank erosion contributes about 8-10 percent of the sediment load to surface waters. With the recent record high water levels along the Great Lakes, shoreline erosion has greatly accelerated, contributing tremendous amounts of sediment to harbors and the Lakes themselves. In an urban setting, streambank and shoreline erosion can result in downstream damages, and threaten adjacent buildings. From the point of view of erosion control practices, two problems are worth noting: (1) streambank/shoreline erosion control practices are usually very expensive; and unless significant damage is occurring or threatening to occur, local governments tend to place a lower priority on their installation; (2) there is often a lack of technical knowledge about stream and shoreline dynamics and lower cost management practices which can mitigate erosion problems over time. Streambank/shoreline erosion control is usually not viewed as an outgoing management problem; rather, problems are allowed to worsen until they become serious, at which time they require more expensive practices involving channel dredging, earth moving, rock riprap, gabions, concrete channel structures, seawalls, groins, etc. A few communities are now viewing the management of streams and shoreline in much the same way as their road maintenance -- applying lower cost non-structural solutions (vegetative, soil bioengineering, site management, etc.) practices on a continuous basis in an effort to avoid more costly outlays.

IV. INNOVATIVE PROGRAMS AND PROJECTS

The following section examines a number of innovative and pilot programs that address soil conservation in nontraditional ways. Federal, State and local programs are included in an attempt to illustrate the range of soil erosion and sedimentation control programs in the region. The programs are subcategorized according to the main emphasis of the program. In cases where the program includes more than one area of emphasis, e.g. training and regulation, the program is listed under the category for which the program is considered to be most innovative.

A. PLANNING AND MANAGEMENT

Planning by Hydrologic Area - Illinois

- Hydrologic areas are being used as the planning unit for decisions on the program services needed to address the local resource concerns, including soil erosion.

Description:

The major resource concerns in Illinois, as identified by the Resource Conservation Act process, are soil erosion, farmland protection, water quality, land use changes, flooding, water supply, wildlife habitat, and socioeconomic issues. The Illinois Soil Conservation Service has recognized that most of these resource concerns can be addressed more effectively if they are identified locally and programs are delivered by hydrologic areas.

A pilot program is being implemented by the Illinois SCS in 14 counties, with plans to expand the program to all counties in Illinois over the next 3 to 4 years. The watershed units within the participating counties develop comprehensive resource plans. Political boundaries are not changed; the program operates within county boundaries, with coordination across county lines as needed.

Planning at the hydrologic area level provides for the involvement of the local landowners in determining the goals and priorities in the watershed. Resource planning by hydrologic area also allows local decisionmakers to balance public and private interests and consider the potential on and offsite benefits of alternative strategies.

The Illinois SCS has been enthusiastic about the results in the pilot hydrologic planning areas, and sees great potential for addressing local resource concerns through the program.

Contact for additional information:

USDA - Soil Conservation Service
Springer Federal Building
301 N. Randolph Street
Champaign, Illinois 61820
(217) 398-5267

Clean Water Incentives Program - Michigan

- State grant money is allocated on a priority watershed basis to address nonpoint water quality problems.

Description:

The Michigan Departments of Agriculture, Natural Resources and Transportation have joint responsibility for administering the Michigan Clean Water Incentives Program, an integrated approach to the nonpoint source pollution problems. Although the program is designed to address water quality problems in general, soil erosion and sedimentation control methods are often the major mechanisms for addressing the problems.

The watersheds throughout the State are ranked on factors such as the degree of the water quality problem, effectiveness of available control programs for the problem and the potential public benefits of the program. The watershed approach allows for local input regarding the objectives of the project and provides the opportunity to develop a comprehensive control program for the watershed.

The Michigan Clean Water Incentives Program is being started in FY 1987. Seven planning grants of $50,000 each will be allocated to five rural and two urban watersheds. In FY 1988 the emphasis will shift to implementation. Cost-share money of $300,000 will be made available for projects that reduce nonpoint source pollution and have a subsequent improvement of the water quality. The $300,000 will be allocated at $100,000 a year, for three years.

An additional cost-share program aimed at soil erosion and sedimentation control will begin in FY 1988. This program will be administered through the Soil Conservation Districts.

Contacts for additional information:

Michigan Department of Natural Resources
Surface Water Quality Division
Stevens T. Mason Bldg.
P.O. Box 30028
Lansing, MI 48900
(517) 373-2867

Michigan Department of Agriculture
Environmental Division
Ottawa Bldg. N., 4th Floor
P.O. Box 30017
Lansing, MI 48909
(517) 373-2620

Michigan Department of Transportation
Bureau Transportation Planning
P.O. Box 30050
Lansing, MI 48909
(517) 373-2240

Systems Approach to Resource Management - Ohio

o Combinations of cultural, management and structural practices are being used by the Agricultural Stabilization and Conservation Service (ASCS) in Ohio to protect the soil and maintain water quality. This approach may be applied to a farm watershed or conservation treatment unit (CTU).

Description:

The ASCS in Ohio is using a broad rather than individual practice approach to reduce erosion to tolerable levels in watersheds. By using a total resource management approach for cost sharing the conservation needs of the farmer may be better met and the public investment in the cost-shared practice protected.

Some of the innovative aspects of the ASCS program are:

* Applying cultural, management and structural practices to terrace systems, diversion facilities and water impoundment reservoirs (ponds) to reduce erosion to a tolerable level "T" above requested structural practices;

* Using total resource management approach for cost sharing. For example, a watershed must be brought under "T" before ASCS will cost share on waterway;

* Changing the State ACP handbook to incorporate water quality criteria for several practices, especially in the Lake Erie Basin. This ensures that erosion levels (or "T") will not be the sole determining factor for cost-sharing. This is an important change since erosion rates in the Ohio portion of the Basin are at or below T -- but off-site chemical and sediment transport is among the highest in the United States.

* Discouraging mowing of Conservation Reserve Program (CRP) land until after August 1 of each year to protect wildlife habitat, specifically nesting areas.

Contact for additional information:

USDA - Agricultural Stabilization and Conservation Service
Room 540, Federal Bldg.
200 N. High St.
Columbus, OH 43215
(614) 469-6735

Dane County Land Records Project - Wisconsin

o University of Wisconsin - Madison researchers are working with county, state and federal agencies, private firms and professional groups on a project using contemporary technology (satellite positioning) to modernize land records, making them both more accurate and more compatible with a computerized land information system.

Description:

Historically, it has been extremely difficult and costly to relate property information to topographic and other map information such as soils and wetlands.

There are two survey systems in the United States. One, the Public Land Survey System (PLSS) serves as a legal reference framework for property boundaries. The second, the National Geodetic Network, serves as a mathematical reference system for mapping and engineering projects. Generally, ground survey techniques are used to connect the two reference systems. This requires considerable time and effort and is often cost prohibitive.

Satellite positioning technology may revolutionize the manner in which surveying is done. Satellite receivers need only "see" satellites so the need for angle and distance measurements are eliminated. Also, since satellite receivers function automatically, the cost of linking the two reference systems is greatly reduced.

Soil erosion management epitomizes the importance of linking the two reference systems. The linkage will facilitate the registration and comparison of different types of land information, which in turn will make it technically and economically feasible to determine the source of soil erosion from the resource record such as a soil map and the cause of erosion from the property record.

The aim of the Dane County Land Records Project is to use satellite positioning and other contemporary technology to:

* modernize the U.S. Public Land Survey System (PLSS);

* improve accuracy and consistency of land records;

* improve and accelerate soil erosion planning and management in Dane County;

* estimate costs to replicate the system in other counties;

* implement a modernized multi-purpose land information system to allow for quicker and more efficient methods of land planning.

Results of the Dane County project will include a complete digital soils record for the county, along with other digital county-wide maps such as the PLSS network, wetlands, streams and drainage basins. Also, the project results will enhance planning and management, administration and regulatory functions of government on all levels, and should help to reduce the costs of surveys to landowners.

Contact for additional information:

University of Wisconsin, Environmental Resources Center
1450 Linden Dr.
Madison, WI 53706
(608) 262-0020

Clean Lakes Program; Clean Water Act - Federal

o The Clean Lakes Program established under Section 314 of the Water Quality Act of 1987 (PL 100-04) requires each State to submit a biennial report to the U.S. Environmental Protection Agency (EPA) on the water quality of all publicly owned lakes in the State.

Description:

Beginning in 1988 as part of its Water Quality Inventory report, each State is required to submit a biennial report to the EPA on the water quality of all publicly owned lakes. The report will include:

* an identification and classification according to eutrophic condition;

* a description of procedures, processes, and methods (including land use requirements) to control sources of pollution in such lakes;

* a description of methods and procedures to restore lake water quality, including innovative methods of neutralizing and restoring buffering capacity of lakes and methods of removing toxic substances mobilized by high acidity;

* a list and description of those publicly owned lakes for which uses are known to be impaired including those lakes that are not meeting water quality standards or which require control programs to maintain compliance.

* an assessment of the status and trends of water quality in the lakes of the State, including the nature and extent of pollution loading from point and nonpoint sources and the extent to which the use of lakes is impaired by such pollution, particularly toxic substances.

The CWA authorizes annual appropriations not to exceed $30,000,000 to States to carry out approved methods and procedures to control sources of lake pollution and to restore the quality of such lakes.

Also authorized is $40,000,000 to conduct a demonstration program with an additional $15,000,000 authorized for grants to establish methods and procedures to mitigate the harmful effects of high acidity on lake water quality.

Contact for additional information:

U.S. EPA - Region V, Water Division
Planning and Standards Section
230 S. Dearborn St.
Chicago, IL 60604
(312) 353-2154

Nonpoint Source Management Program: Clean Water Act - Federal

o The Nonpoint Source Management Program (Section 319) of the Water Quality Act of 1987 (PL 100-04) requires each State to prepare a nonpoint source pollution assessment report identifying categories of nonpoint sources of pollution and describing state and local programs for controlling nonpoint sources of pollution.

Description:

Each State is responsible for preparing and submitting to the U.S. Environmental Protection Agency (EPA) a management program which describes the State plan for controlling pollution from nonpoint sources and for improving water quality. Each program is to include:

* the best management practices (BMP) and measures to be undertaken to reduce pollutant loadings reported in the State Assessment Report.

* the programs to achieve implementation of the best management practices including, as appropriate:

  - nonregulatory or regulatory programs for enforcement,
  - technical assistance and technology transfer,
  - financial assistance - including loan and grant,
  - education and training, and
  - demonstration projects;

* an implementation schedule, with emphasis on getting best management practices in place at the earliest practicable date;

* a certification that the laws of the State provide adequate authority to implement the management program or if not, a list of additionally needed authorities together with a schedule and commitment from the State to seek such authorities, expeditiously.

If a state does not submit an Assessment Report, within 30 months from the date of enactment of the Act, EPA will prepare the required Assessment and report the fact to Congress.

If a State does not submit a Management Program or if EPA does not approve a State's Management Program, a local public agency or organization with capability and authority to manage nonpoint sources of pollution, may (with the State's approval) request technical assistance from EPA, which EPA shall supply to prepare a Management Program for its jurisdiction. Upon approval by EPA of such a program, the organization shall be funded as if it were a State under CWA.

PL 100-04 authorizes four new sources of funds in the CWA on an annual basis to support the implementation of a State's nonpoint source Management Program.

To assist States in implementing their NPS management program, $400 million for use as grant funds is authorized to be appropriated over four years. These funds are not to be used as a general subsidy or for

cost sharing to support implementation of best management practices by individuals. For protection of groundwater quality from nonpoint sources $7.5 million is authorized annually.

Contact for additional information:

U.S. EPA - Region V, Water Division
Planning and Standards Section
230 S. Dearborn St.
Chicago, IL 60604
(312) 353-2154

B. INFORMATION AND EDUCATION

Soil Erosion and Sedimentation Control Training and Certification Program - Michigan

o A Michigan Department of Natural Resources program trains personnel from the local agencies responsible for issuing the permits required by the Soil Erosion and Sedimentation Control Act of 1972.

Description:

The State of Michigan enacted the Soil Erosion and Sedimentation Control Act in 1972. The Act requires earth change activities to be conducted under the provisions of a permit or special agreement, or according to an approved operating plan for public agencies actively involved in construction. The Act further requires that agencies responsible for issuing permits shall have personnel who are "qualified and experienced." To establish the basis for determining that personnel are qualified and experienced, the state has developed a procedure for training and certifying the local officials. The training program has three phases; phases one and two involve classroom training and phase three is a written examination.

The Phase I Training Program is a two day classroom session which includes a review of the basic elements of soil erosion and sedimentation control, procedures for addressing violations, and the administration of the Act.

The Phase II Training Program is a one day session which focuses on a case study to identify typical soil erosion and sedimentation control measures for construction sites, and to learn how to use Technical Release 55, a model for calculating the volume and rate of runoff developed by the SCS. Once a person has satisfactorily completed the two training programs, fulfilled the service requirements, and passed the written examination, a Training Certificate is issued.

The following publications have been developed for the training program:

* Michigan Soil Erosion and Sedimentation Control Guidebook
* Michigan Soil Erosion and Sedimentation Control Training Manual
* Enforcement Strategy Manual

* Soils and Runoff
* Sediment Basins
* Diversions
* Vegetative Erosion Control
* Map Interpretation and Plan Review
* Soil and Water Analysis Managements Program
* Construction Details (set of graphics)
* A Better Environment Through Soil Erosion and Sedimentation Control (The Law and Corresponding Rules)
* Training Certificate

Contact for additional information:

Michigan Department of Natural Resources
Land and Water Management Division
P.O. Box 30028
Lansing, Michigan 48909
(517) 373-8000

Subirrigation/Drainage Project - Michigan

o Researchers at Michigan State University (MSU) and the Soil Conservation Service (SCS) are evaluating subirrigation as a cost-effective method of increasing crop yields using the spatial information management system developed at MSU.

Description:

Subirrigation has been proposed as a cost-effective method of increasing crop yields. Researchers at MSU and the SCS are studying the applicability of subirrigation to Michigan soils which are similar to soils throughout the eastern United States. The SCS and MSU have outlined a two year study in the Saginaw Bay area of Lake Huron which will look at major areas of concern.

The first area is the suitability of soils for subirrigation. The study will consider soil characteristics, location, adjacent soils and site elevations. A second area of focus will be water availability and the impact of subirrigation on water quality, both surface and groundwater. A third part of the study will focus on socioeconomic impacts. This will include economic potentials and environmental concerns. Lastly, the on-farm engineering aspects will be addressed including system design, installation, operation and maintenance.
A final plan will suggest the future needs for implementation and propose activities for the second year of the study.

Contact for more information:

USDA - Soil Conservation Service
1405 S. Harrison Rd., Room 101
E. Lansing, MI 48823
(517) 337-6702

Stream Corridor Management: A Basic Reference Manual - New York

- A self-help manual has been prepared to provide local officials and groups with information on ways to encourage protection, restoration and enhancement of streams.

Description:

The "Stream Corridor Management Manual was prepared by the New York State Department of Environmental Conservation, Division of Water, and made available in 1986. It is a self-help manual for local planners, groups and citizens interested in protecting and enhancing their streams.

The manual discusses land-use related problems and their causes. Different actions that can be taken to enhance the stream are discussed at length, including: community education programs, incentive programs to encourage landowners to implement conservation practices, protective laws, zoning and land use standards, stream easements and acquisitions, and the mobilization of existing grants-in-aid programs.

Contact for additional information:

Bureau of Water Quality
Division of Water
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233
(518) 457-6781

Ohio Stream Management Guide

- The "Ohio Stream Management Guide" examines watershed and riparian management alternatives for stream channel restoration and modification projects. These alternatives include a variety of streambank stabilization and soil conservation practices.

Contact for additional information:

Division of Soil and Water Conservation
Ohio Department of Natural Resources
Fountain Square, Building E
Columbus, Ohio 43224
(614) 265-6610

C. FINANCIAL ASSISTANCE

Clean Water Partnership Act - Minnesota

- The Clean Water Partnership Act establishes a financial and technical assistance program administered by the Minnesota Pollution Control Agency to protect and improve surface and groundwater by controlling water pollution associated with land use and land management activities. Assistance is in the form of grants

to local units of government and technical assistance with the development and implementation of projects.

Description:

Achievement of Minnesota's water quality goals will require a comprehensive water quality program implemented through a coordinated state and local partnership which provides the flexibility to meet the variety and complexity of problems resulting from nonpoint sources of pollution.

In 1987, Minnesota created the Clean Water Partnership Program within the Pollution Control Agency (PCA). The PCA will be responsible for adopting rules to implement the program and developing a state plan to control nonpoint sources of pollution in order to meet the requirements of the Clean Water Act.

Financial assistance in the form of grants for up to 50 percent of the costs of a project may be provided to eligible units of local government including:

* municipalities, towns, counties and watershed districts;

* soil and water conservation districts (through joint powers or contract);

* Any special purpose district or authority exercising control in water and land resources management at the local level.

To be eligible, local units of government must submit a project application and one of the following:

* comprehensive water plan;

* surface water management plan;

* an overall plan required until 1991;

* other local plan that provides an inventory of existing hydrologic information on the area, general identification of water quality problems and goals, and demonstrates a commitment to water quality protection and improvement.

Technical assistance will be provided to local units of government to ensure efficient and effective development and implementation of projects and coordination of projects with other water management activities.

The program also provides for a state water quality assessment for geographical areas with waters that have been polluted by nonpoint sources or have a high potential for water pollution from nonpoint sources as well as the establishment of project coordination teams with members from the Department of Natural Resources, Soil and Water Conservation Board, Department of Agriculture, Department of Health, State Planning Agency and others. This team will advise the PCA in preparing rules and evaluating projects.

Contact for additional information:

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155
(612) 296-6300

Reinvest in Minnesota (RIM) Reserve Program

- The Reinvest in Minnesota Reserve Program is designed to complement the federal Conservation Reserve Program, providing financial incentives for farmers to take highly erodible lands out of production and implement soil erosion control practices.

Description:

In early 1984, a Governor's Citizens Commission was developed to examine ways to improve hunting and fishing in the state. Their report in late 1984 concluded that the natural resource base was deteriorating and could not handle more tourism, the hunting and fishing demands of Minnesotans were not being met within the state, and programs were needed to improve water quality, reduce erosion and improve the fish and wildlife habitat.

A wide range of groups, including sporting, environmental and business interests, banded to form the RIM Coalition in 1985. Through the efforts of the broad-based coalition, the Reinvest in Minnesota (RIM) Resources Act of 1986 was passed and $16 million in funding was made available. Of the $16 million, $6 million is to be used by the Minnesota Department of Natural Resources for habitat rehabilitation and $10 million is targeted for the Minnesota Conservation Reserve Program.

The Reinvest in Minnesota (RIM) Resources Act of 1986 was enacted to address three main objectives: the enhancement of fish and wildlife habitat, conservation of marginal agricultural lands, and protection of water quality. The $10 million State funded conservation reserve program is the largest package in the Act. Through the RIM Reserve Program, districts acquire State easements on marginal agricultural land. The program is designed to complement the Federal Conservation Reserve that is included in the Food Security Act of 1985, and has similar eligibility requirements. The first enrollments in the RIM Reserve began in September 1986, and the initial interest in the program has been favorable.
Contact for additional information:

State Soil and Water Conservation Board
Minnesota Department of Agriculture
90 West Plato Blvd.
St. Paul, Minnesota 55107
(612) 296-3767

Conservation Resource Assistance for Farm Tenants (CRAFT) - Ohio

- The CRAFT program provides economic incentives for tenant farmers to use soil conservation practices. Participating tenants receive payments that are used to pay interest on operating and equipment loans.

Description:

Although tenants and renters also have a significant impact on the soil, conventional soil conservation programs are aimed primarily at landowners. In the CRAFT Program tenant farmers are encouraged to use soil conservation practices. A two year pilot program is being implemented in Upper Scioto River Watershed in Hardin County, Ohio and Pleasant Township in Clark County, Ohio. The Ohio SCS applied for and received $120,000 in RCA special study money and the Department of Natural Resources invested $30,000 of the department's nonpoint source pollution abatement fund into the CRAFT program. Of that money, $120,000 will go to tenants, with the remaining $30,000 being used for landowner incentives.

Since most tenants do borrow money, the Division of Soil and Water Conservation designed a program that allows for reduced interest on operating or equipment loans for the tenants and renters who implement soil conservation controls. The tenants can receive up to $2,000 for two years. A conservation plan is designed and a four-year agreement is made with the tenant. A four-year agreement is required so that the impact of the program can be studied for an additional two years after the two-year CRAFT payment period.

CRAFT will be evaluated at the end of the two year project period. If it is successful, it could be expanded to include thousands of tenant farmers in Ohio.

Contact for additional information:

Division of Soil and Water Conservation
Ohio Department of Natural Resources
Fountain Square, Building E
Columbus, Ohio 43224
(614) 665-6610

OR

USDA - Soil Conservation Service
200 N. High Street
Columbus, Ohio 43215
(614) 469-6962

Nonpoint Source Water Pollution Abatement Program - Wisconsin

- Wisconsin has developed a cost-share grant program through the Department of Natural Resources addressing nonpoint source pollution on priority watersheds to achieve the goal of fishable and swimable lakes and streams and healthy groundwater.

Description:

With the control of the majority of point sources discharges, urban and rural nonpoint sources are now considered the primary sources of pollution in the majority of lakes and streams in Wisconsin.

The Nonpoint Source Water Pollution Abatement Program provides cost-share funds to local implementers (counties, cities, etc.) on a priority watershed basis to address nonpoint source pollution problems.

DNR program activities to date include:

* expanding the list of watershed projects eligible for funding;

* developing policies and procedures for extending the period for installation of best management practices;

* developing a model ordinance for controlling erosion and runoff from construction sites;

* implementing the Milwaukee River Watershed Project including developing a "prospectus", an information and education reference report and service contracts with counties in five watershed areas.

Through 1985, there were 29 priority watershed projects in some stage of development or implementation involving 39 counties. From 1979 through 1985 almost $18,000,000 in grant funds had been awarded.

Contact for additional information:

Wisconsin Department of Natural Resources
Bureau of Water Resources Management
101 S. Webster St.
Madison, WI 53703
(608) 267-7610

Soil Erosion Control Program - Wisconsin

o The Soil Erosion Control Program is a grant cost-share program through the Department of Agriculture, Trade and Consumer Protection formed to assist counties in the preparation of erosion control plans and in the implementation of approved plans.

Description:

The Soil Erosion Control Program is Wisconsin's primary vehicle for implementing soil erosion control goals. Fifty-five counties are required to complete erosion control plans by mid-1987. The program provides funding to county land conservation departments for the purpose of preparing the plans. Counties may receive cost-share grants at a rate of 50 percent of the costs incurred in the plan preparation.

During the implementation phase counties may participate at a rate of up to 70 percent of the cost of the practice, funded by DATCP.

Additionally, grants are provided to counties at a rate of up to 100 percent for administrative, technical, informational and educational assistance provided to farmers.

Implementation grants provide assistance to farmers whose lands have been identified in the plan as being in priority areas.

In late 1984, the Wisconsin Land Conservation Board submitted a major report on soil erosion in the State with findings and recommendations to the Governor and Legislature. Partly as a result of the report several changes were incorporated into revisions of the Soil Erosion Control Program. These included:

* adoption of a statutory soil loss goal of T (tolerable level) by the year 2000;

* requiring all persons who receive farmland preservation income tax credits to comply with soil conservation standards established by the county. These standards must meet minimum standards set by the Land Conservation Board;

* reducing the maximum cost-share rate to farmers for installation of conservation practices from 75 to 70 percent to coordinate with the cost-share rates provided through the DNR Nonpoint Source Control Program.

Contact for additional information:

Wisconsin Dept. of Agriculture, Trade and Consumer Protection
Land Resources Bureau
801 W. Badger Rd.
Madison, WI 53713
(608) 267-9782

Conservation Reserve Program: Food Security Act - Federal

o The Conservation Reserve Program provides financial incentives for landowners to take highly erodible land out of production for ten years and install soil erosion control practices.

Description:

One of the provisions in the Conservation Title of the Food Security Act of 1985 is the Conservation Reserve Program. The Conservation Reserve Program is designed to take the most erodible land out of production. Farmers with eligible land bid for contracts to take their land out of production and keep it out of production for at least 10 years. Those who are awarded contracts receive annual rental payments and are reimbursed for 50 percent of the cost of establishing conservation measures for that land. The conservation plans are approved by the local conservation district.

A total of 40-45 million acres is to be put into the reserve by 1990. Each state is allocated a portion of the land enrolled in the reserve, based on their percentage of the eligible lands. No more than 25 percent of the cropland in any county may be placed in the reserve. Individual producers are limited to $50,000 in rental payments for any fiscal year.

Eligible lands include cropland in Land Capability Classes (VI-VII) and lands in Land Capability Classes (II-V) which are eroding in excess of twice the soil loss tolerance level. There are approximately 20 million acres eligible for the Conservation Reserve Program in the eight Great Lake States, with a significant share of the eligible lands within the Great Lakes Basin portion of the states.

Contact for additional information:

USDA - Soil Conservation Service
1405 S. Harrison Rd., Room 101
East Lansing, MI 48823
(517) 337-6702

D. LEGISLATION

Conservation Reserve Act - Illinois

o Illinois has proposed legislation to establish state policy for retiring marginal, highly erodible cropland to complement the federal Conservation Reserve Program.

Description:

In 1987, the Illinois Conservation Reserve Act was introduced in the Legislature establishing State policy of retiring marginal, highly erodible cropland, particularly land adjacent to public waters and drainage systems and re-establishing perennial vegetation. The Act also authorizes the Director of the Department of Agriculture to acquire conservation easements under the Save Illinois Topsoil Program and establishes a special matching fund in the State treasury for the protection of critical wildlife habitat under the Illinois Natural Resources Enhancement Program. Appropriations to the fund will match private contributions to the fund, but will not exceed them.

Selection of eligible land for the Save Illinois Topsoil Program will be based on its potential for fish and wildlife production, reducing erosion and protecting water quality.

Land may be eligible for the Save Illinois Topsoil Program if:

* It is marginal agricultural land or adjacent to marginal agricultural land;

* It is at least five acres in size or is a whole field as defined by the Director;

* It was in agricultural crop production or pasture for at least two years during the period 1981-1986;

Funding for the Save Illinois Topsoil Program and the Illinois Natural Resource Enhancement Program will be accomplished through the "Reinvest in Illinois Resources Fund" created as a special fund in the State treasury.

Money from the fund may be spent for the following fish and wildlife conservation enhancement purposes:

1. Development and implementation of a comprehensive fish and wildlife management plan;

2. Implementation of the Save Illinois Topsoil Program;

3. Soil and water conservation practices to improve water quality, reduce soil erosion and crop surpluses;

4. Enhancement of habitat on public and private lands;

5. Acquisition and development of public access sites and recreation easements to lakes, streams and rivers for fish and wildlife oriented recreation;

6. Matching funds with government agencies and the private sector for acquisition and improvement of fish and wildlife habitat;

7. Research and surveys of fish and wildlife species and habitat;

8. Enforcement of natural resource laws and regulations;

9. Information and education; and

10. Necessary support services to carry out these purposes.

Contact for additional information:

Illinois Department of Agriculture
State Fairgrounds
Springfield, IL 62794
(217) 782-2171

OR

Illinois Department of Conservation
524 S. Second St., Room 425
Springfield, IL 62706
(217) 782-6302

Indiana's Evolving Erosion and Sedimentation Control Program

- Funding for Indiana Soil Conservation and Lake Enhancement Program is being pursued through the State Legislature.

Description:

New legislation and start-up funds have evolved from the work of the Governor's Soil Resources Study Commission. The Commission assessed the extent, cost, and economic impact of soil erosion in Indiana in its 1984 interim report. The Commission established goals and 15 recommendations in its final report in 1985. Those were, by the year 2000, to reduce erosion on each acre of land to its tolerable level, T, or below; and to control all off-site sedimentation by application of the best practical technology.

The 1986 Legislature accepted the recommendations concerning the administrative restructuring, including creating the Division of Soil Conservation in the Department of Natural Resources, but failed to appropriate funds. An intensive information campaign by soil and water conservation districts and other organizations interested in the program followed in each county. Numerous meetings of civic and community clubs, newspaper and magazine articles, exhibits at county fairs, and tours sponsored for legislators and other clientele made up the effort. A "T by 2000" logo was adopted and used in newsletters, publications, displays and bumper stickers. Additional support developed by groups concerned about lake sedimentation.

In 1987, an excise tax on soft drinks was introduced in the Legislature to fund soil conservation and lake enhancement programs ("T by 2000"). This proposed dedicated, graduated tax would have increased from 4 cents per gallon in 1988 to 10 cents per gallon in 1990 to provide $20 million annually. A tax on products that were dependent on clean water and corn sweeteners seemed logical to fund a soil conservation program. However, the bill lacked the necessary support for passage out of committee. In place of this, a one-half cent amendment to an existing bill raised the tax on cigarettes to start the "T by 2000" effort. The one-half cent increase will generate approximately $3.7 million per year for soil conservation and lake enhancement.

The start-up program for the first year involves hiring 46 erosion control technicians to be assigned to the soil and water conservation districts having the most cropland eroding above 2T. One million dollars is also being allotted for the start of the state cost-share program in these areas. Five soil scientists are being assigned in geographic areas to start the urban erosion control programs. A grant to the Cooperative Extension Service will enable the intensification of educational assistance aimed at protection of the soil resource and preventing off-site damages from erosion. Three hundred thousand dollars is being allotted to start studies for the lake enhancement phase of the program.

Key legislators and supporters encouraged the continuation of the information program, including the need for the excise tax on soft drinks to fund the total Commission recommendations. There is a strong feeling

that continued effort and improvement in understanding will make this effort a success in the next General Assembly.

Contact for further information:

Division of Soil Conservation
Indiana Department of Natural Resources
FLEX Lab #1, Purdue University
West Lafayette, IN 47907
(317) 494-8383

E. REGULATION

Michigan Soil Erosion and Sedimentation Control Act of 1972

The Act requires approval for earth changes within 500 feet of a lake or stream or any disturbed area one acre or more in size to prevent off-site sedimentation and the occurrence of erosive velocities.

See description of the Michigan soil erosion and sedimentation control training program in section B, "Information and Education."

Highly Erodible Land Conservation; Food Security Act - Federal

- Beginning in 1990, farmers will not qualify for certain USDA programs if they produce crops on wetlands, or if they produce crops on highly erodible lands without following a locally approved soil conservation plan.

Description:

Two provisions in the Conservation Title of the Food Security Act of 1985 require cross-compliance for farmers who participate in many of the USDA programs. The Highly Erodible Land Conservation provision restricts the production of crops on highly erodible lands. A farmer may only produce crops on these lands if they are following a conservation plan that has been approved by the local district. The Wetland Conservation provision does not allow crops to be produced on converted wetlands.

If the Highly Erodible Lands Conservation and Wetlands Conservation provisions are not followed, farmers become ineligible for other USDA programs such as the price and income supports, crop insurance, disaster payments, Farmers Home Administration loans and other programs under which payments are made with respect to the commodities raised by the farmer. Since about 80 percent of the nation's farmers participate in USDA programs, these regulations have great potential to influence the implementation of soil conservation practices in the Great Lakes Basin and the nation as a whole.

Contact for additional information:

USDA - Soil Conservation Service
1405 Harrison Road, Room 101
East Lansing, MI 48823
(517) 337-6702

F. TAX INCENTIVES

Conservation Credit Help (CCH) - Rushcreek Watershed - Ohio

- A property tax reduction/rebate is being used as an economic incentive for implementation of soil conservation.

Description:

The Conservation Credit Help (CCH) program is designed to demonstrate the effectiveness of a tax reduction/rebate policy to motivate landowners to maintain cropland erosion control. Funds were provided to the Soil Conservation Service through the Resource Conservation Act (RCA). The Perry and Fairfield Soil and Water Conservation Districts (SWCDs) implemented the program through agreements with individual landusers.

In Phase I, a $2.00/acre tax reduction will be provided to landowners utilizing conservation practices to reduce sheet and rill erosion. Phase II will attempt to convert CCH to a permanent program. The program emphasis is on a total Resource Management System. The appropriate systems can be adapted to existing farm operations, and participation is voluntary. Compliance will be determined annually by the use of the "Universal Soil Loss Equation."

The program began in the Fall of 1986. In September, introductory letters and maps were sent to all landowners and farm operators in the Rushcreek watershed. By the deadline date of November 15, 1986, 60 farms were enrolled in the program representing 5,868 acres of cropland, pastureland or hayland. In 1987, 63 farms involving 38 operators and 5,955 acres were enrolled in the program.

The response from farmers within the watershed has been very positive. While the financial incentives of the program are not great, the key has been getting out to talk to individual landowners and farm operators with something to offer. With additional effort over the next three years, this program could be a forerunner in promoting similar tax incentive programs and assisting SCS personnel in getting conservation on the land.

Contact for additional information:

USDA - Soil Conservation Service
200 North High Street, Room 522
Columbus, Ohio 43215
(614) 469-6962

Conservation Credit Program - Wisconsin

o The Conservation Credit Program is a property tax differential assessment approach where adequately protected cropland is assessed at a different (lower) rate than unprotected cropland, to encourage implementation and maintenance of soil conservation systems on cropland.

Description:

The Conservation Credit Program was designed to apply a property tax differential assessment of cropland based on conservation treatment to increase acreage adequately protected. A five year research project was designed and set up by the USDA Soil Conservation Service and the Pepin County Land Conservation Committee in 1983. Eligible landowners in three agricultural townships in Pepin County are provided a $3 per acre conservation credit deducted from property taxes if all cropland is protected. Landowners assume all responsibility for installing conservation practices. Program administration is provided by the Pepin County Land Conservation Committee and funding and technical assistance is provided by the SCS. No special cost sharing is available to defray installation expenses.

Phase I of the project included the field experimentation by application of the $3.00 per acre property tax rebate to landowners that adequately protected all cropland from erosion. Phase II will be the effort to convert the conservation program credit approach to a permanent program..

Some of the perceived advantages and attributes of a conservation credit approach are:

* program emphasis is directed at maintenance of conservation systems installed by landowners under this and/or other programs;

* landowners that control erosion on cropland are rewarded with a conservation credit deduction from annual property tax assessment;

* landowners are encouraged to install cost-effective erosion control practices that may better fit individual financial situations;

* landowners are allowed to install conservation systems that are most suitable to their existing farm operation management;

* participation is voluntary;

* landowners must control all cropland erosion before they are allowed to participate;

* nonparticipants are placed at an economic disadvantage relative to those landowners who do participate;

* policymakers are encouraged to reevaluate attitudes toward landowners that jeopardize long-range productivity of soils in favor of short-term economic gains;

* can be implemented and managed by local units of government with little assistance from state or federal government.

Early results of this study suggest that a conservation credit approach can successfully motivate landowners to install conservation systems to control erosion from cropland. After program implementation a significant increase in acreage protected was observed. Cropland acreage protected from erosion in treatment towns increased from 17,468 acres to 29,165 acres during the first program year (1984). This compared to a 308 acre increase in control towns during the same period. There were 21,762 acres enrolled in the program which was nearly three times the original program estimates.

One hundred and sixty one out of a possible 263 farmers with greater than 40 acres of cropland enrolled in the program. This accounted for over 61 percent of the farmers in treatment towns. Study results indicate that program participation was higher among large farm operations than among small ones. Average cropland acreage of participant landowners was 135 acres while nonparticipants averaged 73 acres. The county average was 92 acres of cropland per farm.

Landowner participation records indicate that the program was an important motivating factor for a large number of landowners to become new cooperators with Pepin County Land Conservation District. Forty six new cooperators signed agreements during 1984 to participate in the program.

Annual soil displacement was reduced by 91,023 tons in treatment towns as a result of the program. Average annual soil loss was reduced from 5.9 to 3.3 tons per acre per year in treatment towns. Soil displacement in control towns was left relatively unchanged during the same time period.

Practices installed by farmers to become eligible for the program were management oriented. They included crop rotation, conservation tillage, contour farming, and contour stripcropping. Farmers elected to install those practices which require limited technical assistance from field office personnel. These practices tend to be lower in cost than structural practices such as terraces, and apparently were more conducive to most farm operations and farmer management capabilities.

Contact for additional information:

USDA - Soil Conservation Service
4601 Hammersley Rd.
Madison, WI 53711
(608) 264-5341

Farmland Preservation Program - Wisconsin

o Eligibility for property tax relief is tied to meeting soil conservation performance standards, as well as being within an exclusive agricultural zone or signing a Farmland Preservation Agreement.

Description:

The Farmland Preservation Program was initiated in compliance with Chapter 91 of the ongoing Wisconsin Statutes. The original objectives of the program were farm preservation and tax relief. As of 1985, a soil conservation performance standard must be met in order to be eligible for the tax credit, making soil conservation a third objective of the program. As a result, some see the program as the primary incentive vehicle for soil conservation in Wisconsin.

The two main components of the program are land use policy and tax credit. The land use policy component consists of each county developing a Farmland Preservation Plan. Eligibility for the tax credit portion of the program is based on the county's land use decisions. In urban counties, only landowners within exclusive agricultural zones are eligible for tax credit. The landowners in rural counties become eligible either through the exclusive agricultural zoning or by entering into a Farmland Preservation Agreement.

At the end of 1985, 4,052 Farmland Preservation Agreements covered 939,500 acres, and an additional 5.4 million acres were under exclusive agricultural zoning. The total tax credits for the year ending June 1985 was $28.1 million for 16,800 landowners, an average of 40 percent of the property tax.

Traditionally, those with Farmland Preservation Agreements, or about 15-20 percent of the tax credits, had contractual provisions requiring that the landowner develop a soil conservation plan. In 1985 this soil conservation requirement was extended to the 80-85 percent eligible through zoning, and the provision was switched to a performance standard. The County Land Conservation Committees had until June 1986 to develop county policies on technical standards and enforcement procedures, with a minimum requirement of T, or the maximum tolerable soil loss, for eligibility.

All new agreements and zoning areas must meet the new soil conservation requirements by the end of 1988. All agreements and zoning set before the end of 1986 will have an additional five year schedule of compliance. Therefore, T should be met on all farmland in the program by 1993, in contrast with the broader State goal of T on all farmland by the year 2000.

Contact for additional information:

Farmland Preservation Program
Wisconsin Department of Agriculture, Trade and Consumer Protection
P.O. Box 8911
Madison, Wisconsin 53708
(608) 266-9819

V. EMERGING AND LONG-TERM CONCERNS FOR THE GREAT LAKES REGION

The following areas have been identified as issues of emerging and long-term concern for soil erosion control administrators for the Great Lakes Region. They are categorized under Legislative Issues, Programmatic Issues, and Off-site Issues.

LEGISLATIVE ISSUES

Implementation of the Food Security Act of 1985 (Farm Bill)

Historically, by allowing farmers to include crops produced on highly erodible lands as part of their base acreage for various support programs, the federal government has in effect promoted increased soil erosion from croplands.

The 1985 Food Security Act (Farm Bill), for the first time expressed a strong federal policy toward erosion control. The Conservation Compliance provisions of the Act require that any farmer who currently annually tills or intends to annually till highly erodible land have a conservation plan for that land to remain eligible for federal farm support programs. The conservation plan must be developed by 1990 and be fully implemented by 1995 or the farmer will be ineligible to participate in USDA loan, price support or other payment programs. Additional provisions of the Farm Bill limit the conversion of highly erodible land for crop production.

An emerging issue is whether the USDA [primarily the Soil Conservation Service (SCS)] and state soil and water conservation districts and extension programs (can) meet the challenge of implementing the provisions of the Farm Bill at a time of current and anticipated future budget reductions. The loss of county revenue through revenue sharing will hinder efforts to implement provisions of the Farm Bill by soil and water conservation districts at the local level.

Nationally, the Cooperative Extension Service is developing a program to train farmers to develop their own conservation plans under the Farm Bill. Even so, technical assistance through the SCS districts will be required to spot check compliance with the proposed plans. Where structural practices are called for by the conservation plan, Soil Conservation staff also will be involved in designing and installing those practices.

For example, USDA estimates that 40 percent of all SCS technical assistance in 1987 and 60 percent in 1988 will be to assist farmers in complying with the Farm Bill. Clearly, without sufficient funds to meet the added requirements brought about by the Farm Bill, it will be difficult to provide the staff support necessary to implement the programs at the federal, state and local levels.

Clean Water Act Reauthorization

On February 4, 1987 the U.S. Senate completed a Congressional override of President Reagan's veto of the Water Quality Act of 1987 by a vote of 86-14. The passage of the Act (PL 100-04) reauthorizes and strengthens the Clean Water Act of 1972.

The major provisions of the Act provide $18 billion over eight years to fund both the Federal Grant Program for sewage treatment plant construction through 1990 and authorization to establish State Revolving Loan Funds to offset increased state and local costs through 1994.

An emerging issue for The Great Lakes States is communicating to Congress the importance of appropriating the funds necessary to implement the programs authorized by the Water Quality Act. For instance, the Act authorizes a new program to manage urban and rural nonpoint sources of pollution, including farmland runoff, urban stormwater, construction and mine runoff. The new law directs each State to prepare an assessment report and management program, by August 1988, and authorizes $400 million over four years for State grants. However, without full appropriation of funds the States will be unable to implement approved programs.

The Act also includes important provisions regarding the Clean Lakes Program, research activities and management of toxic pollutants in the Great Lakes. The Act formally establishes the Great Lakes Program Office in EPA, a Great Lakes Research Office in the National Oceanic and Atmospheric Administration (NOAA) and renews the nation's commitment to implementing the goals of the International Great Lakes Water Quality Agreement of 1978. Authorization for the Great Lakes programs include:

- $11 million per year for the fiscal years 1987 - 1991. Of the amounts appropriated each fiscal year:

    1. Forty percent shall be used by the Great Lakes National Program Office (GLNPO) for controlling and removing toxic chemicals from the Great Lakes, including projects demonstrating various ways of removing or inactivating contaminated sediments;

    2. Seven percent shall be used by GLNPO for nutrient monitoring;

    3. Thirty percent shall be transferred to NOAA for use by the Great Lakes Research Office.

The passage of the Clean Water Act is a strong statement to the importance of clean water nationwide. For the Great Lakes, the Act is particularly significant because it sets specific goals to address pollution problems and coordinated federal efforts in managing both conventional and toxic pollutants in the region. However, without the commitment to appropriate the funds necessary to implement the provisions of the Act, the national goal of clean water will not be realized. From a soil conservation perspective, the issue is whether emphasis on toxics will overshadow funding for sediment control programs, e.g., state phosphorus reduction strategies.

Need for Dedicated Revenue for Sediment Control Programs

Historically, soil and water conservation efforts have been funded by the federal government, primarily as part of the SCS and Agricultural Stabilization and Conservation Service (ASCS) programs. Other conservation related groups, such as the Cooperative Extension Service, utilize local and state appropriations, but still rely heavily on federal funds. While some states have enacted cost sharing programs, soil conservation personnel are still largely supported by federal funds.

The decline of funding for SCS, ASCS and Extension has created a crisis insofar as the local delivery of soil erosion control programs is concerned. At a time when new federal initiatives are requiring added commitment of agency personnel, resources available to support these programs are shrinking. The loss of these funds is compounded by the elimination of federal revenue sharing, thereby severely stressing the budgets of counties. In some states, such as Ohio, county discretionary (e.g. revenue sharing) funds are used to help support soil and water conservation districts and extension programs.

The loss of federal program support dollars has prompted several states to consider legislation authorizing the establishment or use of dedicated sources of revenue for soil conservation and related programs. While attempts at raising new funds are difficult, many elected officials resist the effort to earmark public funds, which forecloses their ability to budget for a variety of needs. Thus, agencies implementing soil erosion and sedimentation control programs must compete with other agencies and programs for limited public funds.

The search for funding sources necessitates that soil conservation program managers establish alliances and develop marketing skills used by other public programs. The need for funding also demands that the public understand the real costs that society bears for erosion and sedimentation. Without sufficient funds to implement the mandated programs of the Farm Bill and other ongoing programs, it is anticipated that soil erosion and sedimentation control efforts will suffer greatly.

PROGRAMMATIC ISSUES

Regulation as a Management Strategy for Erosion Control

Great strides have been made during the past fifty years to control erosion and sedimentation. The original concerns were to protect the land with particular reference to the agricultural community. Significant benefits have been realized to protect the land resources through cost sharing and various kinds of incentive programs. To further protect our land and water resources the U.S. Clean Water Act of 1972 was enacted. The impact of this new management strategy was felt not only by the agricultural community but also in the urbanized areas.

An emerging issue is the question of trying to achieve natural resource management goals using a voluntary approach versus achieving similar goals through a regulatory approach. On the one side public funds are used to

encourage the use of good management practices, and on the other side, the land owner is expected to assume the total burden for protecting the resources. Through the regulatory process there are mechanisms to ensure that appropriate protective measures will be used, but with the voluntary approach, there are more severe limitations that interfere with the possibility of adequately protecting the natural resources.

As a case in point, studies have reported the greatest percentage of sediment loading in public waters is generated from row crops on farm land, and yet, plowing and tilling for the purposes of production and harvesting of crops are exempt from the regulatory process. Another problem occurs on marginal lands that are being used for farming by either the owner or a renter where the minimal returns realized from the operation deter the employment of desired erosion and sedimentation control measures. The penalty is subsequently transferred to the downstream property owner and to the general public.

It is critical that all land users share an equal responsibility for employing effective management programs. This goal could be accomplished by placing greater responsibility on the land users to prevent damages, removing discrepancies in the laws that favor one land user over another land user, and developing procedures for preventing a land user from depleting the quality of the natural resource base at the expense of the general public. This goal is being accomplished by many responsible property owners. However, there are property owners who may need the stronger motivating guidance, provided by regulation.

Stormwater Management

In most States nonpoint sources of pollution contribute significantly to the total pollutant loadings to lakes and streams. Construction activities and uncontrolled stormwater, especially in urbanized areas, can be major factors in the transport of sediment. High public costs of dredging, ditch and channel maintenance and sediment removal from ponds and reservoirs make it increasingly necessary to control runoff from stormwater. The development of effective state and local policies to manage stormwater will significantly reduce nonpoint source pollution generated by the transport of sediment.

Some local governmental units have incorporated stormwater guidelines in their planning and regulatory procedures. This should be encouraged in all urbanized areas, and similar consideration should be given to managing stormwater in agricultural areas that are subject to severe off-site sedimentation.

Various approaches could be used to establish a policy on how to best manage stormwater. The following principles have been used individually, or in combination by local governmental units to prevent erosion and sedimentation and to reduce the threats of erratic hydrologic drainage conditions.

- o Establish guidelines for construction of detention/retention/sediment basins to control the quantity of runoff based on designated storm frequencies, not to exceed the volume of water occurring prior to construction.

- o Establish guidelines to control erosion from a site including such things as the minimization of construction impacts, reseeding and revegetation requirements.

- o Limit the rate of runoff to the rate occurring prior to construction.

- o Establish the size of stormwater control structures on the basis of a set runoff depth appropriate for the community as determined by the professional engineer for that community.

Standardization could be best achieved if each state would develop a stormwater control policy and model local ordinances that could be followed by local units of government.

OFF-SITE DAMAGE ISSUES

"T" Versus Water Quality Goals

The concept of achieving "T", the level of soil loss that can be tolerated without impairing crop production, provides a needed sense of priority setting in addressing problems. Unfortunately, it does not include consideration of off-site impacts such as damage to water quality or other aspects of the environment. Erosion of the land may leave some areas with deficient soil depth, but not cause off-site damage. On the other hand, some areas may be meeting "T" but still causing significant off-site damages. Also, "T" does not address the type of soil material being eroded and reaching off-site locations. For example, while coarse soil carries little adsorbed material, clay sized particles can adsorb large amounts of agricultural chemicals which can be transported greater distances. The result of using "T" to set priorities without consideration of off-site impacts can be seen in the distribution of the Conservation Reserve Program of the 1985 Farm Bill. Although soil erosion causes serious nonpoint source problems in the Great Lakes and their tributary streams, the Conservation Reserve Program is almost totally excluded from the Basin because soils are deep and "T" values are not greatly exceeded.

Chemicals Associated with Sediment

Several problems have prompted consideration of stronger measures to reduce erosion, particularly the public concern with water quality issues associated with farming and other land-use activities. The principal concern may be with chemical pollution of surface and groundwater, in which erosion may only play a limited role. Nevertheless (to a certain extent), public perception of the dangers of chemicals in the nation's water will drive future programs. Fears over chemical pollution have demanded closer scrutiny of all farming practices. In terms of management programs it is

important to look at the types of practices that are efficient (cost effective) at both ends of the scale. That is, emphasizing programs that reduce both erosion and chemical transport.

Also, it is increasingly important to look at fertility management practices such as crop rotation to get at the problems of weed control and nutrient depletion that too often are addressed by increased use of fertilizers and herbicides.

Agricultural Waste Management

Agricultural waste management is of crucial concern especially as it relates to the overall issues of nonpoint source pollution control and nutrient reduction. By pasturing animals near streams or having feedlots adjacent to or on streams the livestock industry contributes heavily to the problem of stream and streambank degradation and overenrichment of soils. Sediment from these areas will also be nutrient enriched causing severe water quality problems in some areas.

Additionally, agricultural waste management becomes important when agencies target funds for erosion and sediment control. Targeting areas associated with livestock operations will be cost effective particularly if nutrient reduction is the goal. Soils eroding from feedlots may have as much as 200 times the amount of phosphorus attached than will soils eroding from normal cropland areas.

By focusing on agricultural waste management practices (assuming limited program dollars) managers may receive the biggest bang for the buck especially if the overall goal is nutrient control and improved water quality.

Effects of Agricultural Erosion and Sediment Control Practices on Groundwater Quality

Groundwater is the principal source of drinking water for many residents in the U.S. Great Lakes Basin. However, because of its hidden nature, the traditional assumption has been that its quality is protected. With increased understanding of the properties and behavior of groundwater, states have become more concerned about protecting its quality.

Federal incentives under Section 106 of the Clean Water Act have accelerated state groundwater program development activities. The passage of the Water Quality Act of 1987, which reauthorizes and strengthens the Clean Water Act should increase the momentum of state activities, particularly in the areas of groundwater contamination identification and remediation.

It is important for state and federal soil erosion and sediment control programs to emphasize groundwater protection and to consider impacts of conservation practices on groundwater more than they have in the past.

Conservation tillage, for instance, retains water that might otherwise have run off into streams or other bodies of water. However, the water that is

retained may infiltrate into groundwater and raise nutrient and pesticide levels in shallow aquifers.

Since the quality of groundwater is often an expression of what is going on at the surface, soil conservation practices need to be implemented and managed in such a way that the overall resource protection will be effectively improved.

OTHER EMERGING ISSUES

The following areas of concern were reviewed and were considered to be lower priority than the preceding issues. However, they are considered significant issues and are described here briefly.

Upcoming Review of the Great Lakes Water Quality Agreement

The Great Lakes Water Quality Agreement of 1972 (amended 1978) is to be reviewed by the United States and Canada following receipt of the third biennial report of the International Joint Commission (IJC). Delivery of the report occurred during the Spring of 1987 and will stimulate official response from the two Governments. Preliminary informal discussions appear to favor limiting revision of the Agreement to a few specific areas, rather than reconsideration of the whole document. Limitation of renegotiation to a few specific subjects should be confirmed and the method and level of state involvement should be established and clarified. However, increased federal funding for the implementation of the Great Lakes Water Quality Agreement will be vitally important and may provide a mechanism to assist the Great Lakes States in addressing soil erosion and sedimentation problems through the achievement of water quality goals.

Remote Sensing/Aerial Photography

Current remote sensing technology, allowing photographs to be made that display different bands of the light spectrum, has proved to be an invaluable resource in many disciplines.

For soil erosion and sedimentation control programs, the technology is applicable to the identification of problems and in tracking progress in solving problems. An example is the Michigan Northwest Region Resource Conservation and Development (RC&D) program (SCS-USDA) which issues the Michigan Resource Inventory Program base maps and color infrared aerial photography to identify eroding streambanks.

Greater emphasis should be placed on the use of aerial photography/ multisensor imagery through more research and increased funding for remote sensing programs in the future.

Water Resources Development Act

On November 17, 1986 President Reagan signed the Water Resources Development Act (PL 99-662) which covers a broad spectrum of federal water project involvement including flood control, shoreline protection, conservation and development as well as inland waterways and deep-draft navigation systems.

The developing issue of who pays for dredging activities is addressed in the Act. With respect to U.S. Army Corps of Engineers maintenance dredging of commercial harbors in the Great Lakes, there are issues of immediate concern. A practical "backlog" of dredging activity is building up because of deferred maintenance due to the recent record high water levels.

Authorization for additional confined disposal facilities for polluted dredged material has expired and existing facilities are beginning to be filled up.

The two hundred or more recreational boat harbors along the Great Lakes have problems of their own. Although constructed with some federal funds, their maintenance for draft requirements may present financial problems to local and state governments when lake levels go down.

Historically, the problem of sedimentation in Great Lakes harbors has been addressed through increased dredging. The passage of PL 99-662 may require managers to assess the cost-effectiveness of addressing erosion and sedimentation problems on-site to help reduce maintenance dredging requirements and costs.

Great Lakes Toxic Substances Control Agreement

Building on the regional cooperation pioneered by the signing of the Great Lakes Charter in 1985 to protect the quantity of the region's water, the Great Lakes Governors adopted a resolution on Great Lakes Toxics Control in December 1985 establishing a task force to draft an agreement that establishes common approaches to dealing with toxic substances in the Great Lakes.

The Great Lakes Toxic Substances Control Agreement stands as a firm expression of shared concern and political will on the part of the governors of the Great Lakes States. It provides a vehicle through which the governors can demonstrate the commitment of their state governments to the cooperative effort needed to protect the waters of the Great Lakes from toxic pollutants.

The Agreement includes 6 basic principles of commitment on the part of the Great Lakes States acknowledging the problem of persistent toxic substances and the need to reduce toxics in the Great Lakes Basin to the maximum extent possible. Also included is a section on implementation of principles which includes such things as permitting, hazardous waste management, atmospheric discharge, monitoring and surveillance, information exchange, human exposure and health effects, public involvement, and oversight and implementation.

Of interest to erosion control administrators is the language in the Agreement recognizing persistent toxic substances as the "foremost

environmental issue confronting the Great Lakes" and calling for "new and creative initiatives" in addressing the problem.

The Agreement also speaks to the variety of pathways of contamination and the need for additional information in this area. It has long been recognized that sediment plays a role in the transport of toxic pollutants to bodies of water. The extent of that role, however, has not been thoroughly researched. The agreement also calls for the expansion of federal initiatives for prompt remedial action for contaminated sediments in the Great Lakes Basin.

Increased recognition of sediment and nonpoint pollution sources as contributors to the toxics problem on the part of the governors and the state pollution control agencies may provide an opportunity to promote sediment and erosion control programs emphasizing water quality benefits.

VI. CONCLUSIONS AND RECOMMENDATIONS OF THE SOIL EROSION AND SEDIMENTATION TASK FORCE

This section presents principal conclusions and recommendations of the Great Lakes Commission's Soil Erosion and Sedimentation Task Force.

Key recommendations are preceded by position statements providing background information. More extensive support for the recommendations is found in the body of the report.

CONCLUSIONS

FUNDING

Position Statement:

The Soil Erosion and Sedimentation Task Force finds that federal, state and local programs are not adequate to control soil loss through erosion or solve sedimentation problems in the Great Lakes Basin. Institutional arrangements are in place and erosion control programs to reduce soil loss are operating on a limited scale in all states, but funding and staff resources cannot address current and emerging needs. Also, primary emphasis has been on erosion control to maintain soil productivity rather than on improving both soil and water quality by reducing off-site transport of sediment. Sedimentation control programs to address water quality are not in place basin-wide and must be developed, funded and integrated with existing erosion control programs.

The Task Force finds that, historically, soil and water conservation efforts have been funded by the federal government, primarily as part of the Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS) programs. Other conservation-related agencies, such as the Cooperative Extension Service, utilize local and state appropriations, but still rely heavily on federal funds. While some states have enacted cost sharing programs, soil conservation personnel are still largely supported by federal funds. However, at a time when new federal initiatives are requiring added commitment of agency personnel, resources available to support these programs are being reduced.

Hence, the Task Force finds that the Great Lakes States, while working for adequate federal support, must assume greater responsibility for financing erosion control programs. There is a need for dedicated sources of revenue to support state and local programs allowing for funding of innovative approaches to erosion control, thus reducing state reliance on federal funding for these programs. The Task Force believes that federal support will continue to decline. Even at constant levels, federal support programs are inadequate to address the problems specific to the Great Lakes Basin.

Regionally, it is expected that the USDA Soil Conservation Service will have trouble maintaining activities at current levels. This is because the Great

Lakes Basin does not have the high erosion rates that are driving federal programs nationwide, though Basin rates are still problematic.

Due to the pervasiveness of the erosion and sedimentation problem in the Great Lakes Basin, the Task force finds that no one level of government can be expected to shoulder the full burden of supporting programs. Funding must occur though a coordinated federal, state and local effort. This approach, however, does not preclude federal obligations to the states. There is a need for federal assistance to the states in areas of program development, technical support and research. There is a special need for federal agencies to focus on high priority problems, particularly those affecting multiple states and the Great Lakes themselves.

The Task Force believes that the Water Quality Act of 1987 (P.L. 100-04), in reauthorizing and strengthening the Clean Water Act of 1977 can be an important vehicle for federal, state and local agencies to promote erosion and sediment control through the achievement of water quality goals. The Task Force therefore supports full funding and implementation of the Water Quality Act of 1987.

The Task Force believes that the new program to manage nonpoint source pollution under Section 319 of the Water Quality Act of 1987 must emphasize sediment control. The Task Force supports the authorization of Section 319 of the Water Quality Act and full appropriation of the $400 million authorized over four years for state grants to implement approved nonpoint source programs. The Task Force believes that Congressional appropriation of the full amount is essential for the Great Lakes States. The Task Force further supports the use of Section 319 funds for: 1) implementation of nonpoint source management plans for sediment control at the local level; and 2) implementation of U.S. EPA and state phosphorus control strategies, which also have sediment control as the primary vehicle for reducing nutrient loads to the Great Lakes.

The Water Quality Act of 1987 also authorizes the creation of State Revolving Loan Funds under Section 602 to fund state and local water quality management efforts. The Task Force recommends that the Great Lakes States incorporate nonpoint source pollution management when developing their loan programs.

The Task Force believes that the Great Lakes National Program Office (GLNPO) of the U.S. EPA (Region V), established under Section 104 of the Water Quality Act, must emphasize sediment control and target special funds for such in nonpoint source pollution projects in the Great Lakes. Hence, the Task Force supports the maintenance of a strong monitoring program by the GLNPO that accommodates and focuses attention on nonpoint sources of pollution.

The Soil Erosion and Sedimentation Task Force believes that full funding and implementation of the Conservation Title of the Food Security Act of 1985 (Swampbuster, Sodbuster and Conservation Compliance Provisions and the Conservation Reserve Program) will also significantly strengthen erosion and sedimentation control efforts in the Great Lakes Basin. It is essential that Conservation Title programs complement on-going programs rather than substitute for them. Adequate staffing of the Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS) of the USDA is essential to the implementation of the Conservation Title of the

Food Security Act and and other programs such as the Agriculture Conservation Program (ACP) and conservation technical assistance. This also requires additional assistance to Soil and Water Conservation Districts (SWCD) to help them meet added responsibilities under the Food Security Act.

The Task Force also advocates increased funding of the ACP program for special projects that provide water quality benefits to the Great Lakes Basin. Soil Conservation Service technical assistance and ACP cost-sharing should also emphasize off-site damage control, as well as the importance of soil conservation protection to the site.

PROGRAM DEVELOPMENT

Position Statement:

The Soil Erosion and Sedimentation Task Force recognizes the contribution of erosion and sedimentation control to the agricultural productivity and environmental quality of the water and related land resources of the Great Lakes Basin. The Task Force acknowledges the Great Lakes system as a special and unique international resource that deserves special attention and protection from the federal government.

Therefore, the Task Force advocates the establishment of a federal, line-item "Great Lakes Basin Program" within the U.S. Department of Agriculture budget to promote a comprehensive, basin-specific erosion and sediment control program. The program, to be modeled in part after the existing "Great Plains Program," shall provide for cooperative federal/state planning and management activities and include an educational component to encourage responsible land-use practices. There should be a linkage with the federal nonpoint source pollution program (Section 319 of the Water Quality Act) to specifically ensure cooperation and coordination of activities with the Environmental Protection Agency.

The Task Force also believes that sediment control programs emphasizing technical assistance, demonstration projects and education which characterize current federal and local conservation programs in rural areas, should be developed for urban areas. These programs should emphasize managing stormwater and controlling erosion from construction sites.

STANDARDS AND CONTROL PROGRAMS

Position Statement:

The Soil Erosion and Sedimentation Task Force finds that, while significant benefits have been realized over the past 50 years to protect the land resource base from the effects of soil erosion through cost sharing and various incentive programs, the infusion of dollars alone is not enough to solve the massive problems of soil erosion and sedimentation. The Task Force finds the need for a more aggressive approach to erosion control to protect water quality and reduce the enormous public and private expenditures to mediate the off-site damages of sedimentation.

The Task Force believes the Great Lakes States should review their existing farm benefit programs to incorporate standards for meeting goals such as T

(tolerable soil loss). Wisconsin, for instance, incorporates "cross compliance" provisions in its Farmland Preservation Program to promote soil conservation. Counties must develop a farmland preservation program and landowners must meet soil conservation standards to be eligible for property tax credits.

The Task Force believes that the Great Lakes States should establish minimum erosion control standards for urban and rural land use activities phasing implementation over a period of years similar to the federal Farm Bill.

The Soil Erosion and Sedimentation Task Force believes that the loss of soil from urban areas is a particular problem that contributes to excessive localized sediment loadings to lakes and streams in the Great Lakes Basin.

Erosion and transport of sediment in urban areas is caused primarily by construction activities and stormwater runoff. Although construction activities in urban settings affect relatively small areas of land, they can lose soil at rates 50-100 times that of cropland. Generally, control of urban erosion is addressed at the local level via municipal or county ordinances. However, the approach to urban erosion control is inconsistent; some localities conscientiously address the problem, while others have no programs.

The Task Force believes that localities should be more aggressive in their approach to urban erosion control by developing and implementing erosion control and stormwater management plans. Also, it is believed that state agencies should have the ability and authority to establish erosion and stormwater standards and enforce them in the absence of local controls. Further, states should develop a statewide standard for erosion and stormwater control that can be followed and implemented by local units of government.

Finally, the Task Force believes that the U.S. EPA and the states should consider establishing sediment guidelines to be incorporated in state and federal water quality standards.

EDUCATION/COALITION BUILDING

Position Statement:

The Soil Erosion and Sedimentation Task Force believes that a critical need exists for increased information and education on the effects of soil erosion and sedimentation in the Great Lakes Basin. Public awareness must increase, particularly as these issues relate to higher profile concerns such as toxic pollutants and groundwater contamination. Information focusing on problems tied to individual land use activities such as agricultural waste management, tillage practices and levels and rates of fertilization must draw attention to the need for proper land use planning. Increased networking and coalition-building between water conservation groups and environmental/wildlife groups must occur to build support for soil erosion and sedimentation control efforts in the Great Lakes Basin. The Task Force believes that a broad-based, ongoing initiative to disseminate information on soil erosion and sediment control efforts in the Great Lakes Basin is needed, to establish the network of these and other groups with similar interests and goals.

RESEARCH AND EVALUATION

Position Statement:

The Soil Erosion and Sedimentation Task Force believes that a substantial research program is needed to provide information in several areas and disciplines related to the issues of soil erosion and sedimentation.

Research efforts should be undertaken in the following areas:

- Quantifying Off-site Impacts of Sedimentation. Information on the off-site effects of sedimentation is lacking. Quantitative data on the off-site impacts of sedimentation in the Great Lakes Basin is particularly scarce. Impacts associated with sedimentation include increased dredging costs; increased stream channel and ditch maintenance; damage to water treatment and conveyance facilities; effects on recreation and wildlife; and, the transport of toxic pollutants with the sediment. No reliable figures are available detailing the extent of damages attributable to sedimentation or the public and private costs incurred for clean up. This information is critical for decision makers to utilize in allocating limited program dollars to areas where they will do the most good.

- Relating "T" to Water Quality Goals. The concept of achieving T, the level of soil loss that can be tolerated without impairing crop production provides a sense of priority setting for erosion control administrators. However, it precludes consideration of off-site damages to water quality and other aspects of the environment. There is a need to equate T with water quality goals, particularly for areas such as the Great Lakes region which are not highly erodible. Most of the areas in the Great Lakes portion of the eight states are eroding at rates of T or less; yet many areas are experiencing severe water quality problems from excessive sedimentation. Information on T versus water quality is needed to allow the states to set an erosion control standard that they can adopt and enforce as part of their water quality standards.

- Chemicals Associated With Sediment. It is important to quantify the role that sediment plays in the transport of toxic pollutants. Fears over chemical pollution of both surface and groundwater have demanded closer scrutiny of farming practices. Pollutants from agricultural land areas include chemical fertilizers, pesticides, herbicides and nutrients from plant residue and animal wastes. From a management perspective, the role that sediment plays in the transport of toxics should be acknowledged as an important component in achieving water quality goals. Practices that reduce both erosion and chemical transport should be emphasized. Quantifying the role that sediment plays in the transport of toxics will assist managers in making these decisions.

- Effects of Erosion and Sediment Control Practices on Groundwater. It is important for state and federal soil erosion and sediment control programs to emphasize groundwater protection and to consider impacts of conservation practices on groundwater. Conservation tillage, for instance, retains water that might otherwise have run off into streams or other bodies of water. The water that is retained may infiltrate

into groundwater and raise nutrient and pesticide levels in shallow aquifers. More quantitative information on the effects of erosion and sediment control practices on groundwater is needed in the Great Lakes Basin.

- o Evaluation of Program Effectiveness. With limited funds, it is imperative that managers begin to critically evaluate the effectiveness of programs. Future funding needs and program orientation can be determined only by assessing the relative cost-effectiveness of current control programs, and the extent to which water quality problems can be attributed to soil erosion and sedimentation. With nonpoint sources of pollution it's very difficult to show a causal relationship when water uses are impaired. More research needs to be done in these areas. The Task Force also believes that current monitoring programs should be maintained, but the need exists to support monitoring efforts with other methods of evaluation (e.g., biomonitoring). These methods should be explored and developed.

- o Sediment Standards. The Task Force believes that the EPA and the states should evaluate the use of sediment standards to be incorporated into state water quality standards. Historically, the relationship between sedimentation and water quality has not been adequately emphasized in the development and implementation of sediment control programs in the Great Lakes Basin. The Task Force believes state and federal research programs should evaluate the feasibility of setting sediment standards comparable to those that exist for other pollutants for achieving water quality goals.

RECOMMENDATIONS

GENERAL

1. The Great Lakes Commission accepts the report of the Soil Erosion and Sedimentation Task Force, and adopts the position statements presented above as general guidance in future advocacy efforts.

FUNDING

1. The Great Lakes Commission shall convey to its member states a recognition that the states should assume greater responsibility for financing soil erosion control problems in light of the pervasiveness of the problem and declining federal funds. In so doing, the states recognize that control must take place primarily at the local level with emphasis upon water quality considerations and off-site impacts. The Commission further recognizes that dedicated sources of revenue should be provided to support state and local delivery systems and fund innovative approaches to erosion control.

   The Commission shall convey these views, in its advisory capacity, to appropriate legislators, agricultural and water quality officials in its member states.

   The effort shall be initiated in October 1987.

2. The Great Lakes Commission shall advocate authorization for full funding of the nonpoint source program (Section 319) of the Water Quality Act of 1987. Under this Section, the Commission further calls for 1) a major role for the U.S. EPA in assisting states in sediment control as well as in the management of nonpoint sources of pollution; 2) use of funds for local level implementation of nonpoint source management plans; and 3) use of funds for implementation of the U.S. EPA's and state phosphorus control strategies. The Commission shall advocate adequate funding and staff resources at the U.S. EPA Great Lakes National Program Office authorized under Section 104 of the Water Quality Act.

   The Great Lakes Commission advocates the full appropriation of funds for the in-place pollutant demonstration program as provided for in Section 104 of the Water Quality Act of 1987.

   The Great Lakes Commission shall advocate these positions, as appropriate, via correspondence and testimony/presentations to the Great Lakes Congressional Delegation, the members of appropriate Congressional Committees, the Administration of the U.S. EPA, the Region V Administrator of the U.S. EPA, the Director of the U.S. EPA Great Lakes National Program Office, and other appropriate individuals and organizations.

   The Commission shall initiate the effort in October 1987 and continue as needed.

3. The Great Lakes Commission advocates full funding and implementation of the Conservation Title of the Food Security Act of 1985. To implement these programs, the Commission urges adequate staffing of the Soil Conservation Service (SCS) and Agricultural Stabilization and Conservation Service (ASCS) in the Great Lakes Basin, and provision of program grants to states for use by local soil erosion and water conservation districts.

   The Commission shall advocate these positions, as appropriate, via correspondence and testimony/presentations to the Great Lakes Congressional Delegation, members of appropriate Congressional Committees, SCS and ASCS Administrators and other appropriate individuals and organizations.

   The Commission shall initiate this effort in October 1987 and continue as needed.

PROGRAM DEVELOPMENT

1. The Great Lakes Commission, in recognizing the contribution of erosion and sedimentation control to the agricultural productivity and environmental quality of the water and related land resources of the Great Lakes Basin, supports the establishment of a federal, line-item "Great Lakes Basin Program" within the U.S. Department of Agriculture budget to promote a comprehensive, Basin-specific control program. The program, to be modeled in part after the existing "Great Plains Program," shall provide for co-operative federal/state planning and management with special emphasis on coordination of activities with the EPA under Section 319 of the Water

Quality Act, and include an educational component to encourage responsible land-use practices. To this end, the Great Lakes Commission will appoint a "Great Lakes Basin Program Task Force," with member state representation and other members, as appropriate, for the purpose of 1) designing in detail the elements, activities and funding levels of a proposed federal "Great Lakes Basin Program"; 2) developing an advocacy strategy to generate the state, federal and Congressional support needed to establish such a program; and 3) to advise the Commission in the conduct of such a strategy.

The "Great Lakes Basin Program" Task Force membership shall be selected by the respective state delegations to the Commission by November 15, 1987. The Task Force will present a report on items one and two above to the Commission at its 1988 Semi-Annual Meeting, with its advisory role continuing through, but not beyond, the 1988 Annual meeting unless extended by action of the Commission.

2. The Great Lakes Commission acknowledges and endorses language in the Great Lakes Toxic Substances Control Agreement recognizing persistent toxic substances as the "foremost environmental issue confronting the Great Lakes" and calling for "new and creative initiatives" in addressing this complex problem. The Commission further acknowledges and endorses language calling for the expansion of federal initiatives for prompt remedial action on contaminated sediments and regular interstate workshops on techniques for management of contaminated sediments.

   The Great Lakes Commission supports prompt and expeditious implementation of Agreement provisions addressing the problem of contaminated sediments. In so doing, the Commission urges careful consideration of nonpoint source pathways by which toxic substances contaminate the environment via soil erosion and sedimentation.

   The Great Lakes Commission shall convey, by November 1987, these positions to the Council of Great Lakes Governors, and the Great Lakes Environmental Administrators. The Commission shall coordinate, if requested, state input into workshops and other Agreement activities relative to soil erosion and sedimentation control and the management of contaminated sediments. Further, the Commission shall coordinate, if requested, a regional position relative to the expanding of federal programs and funding addressing the issues.

3. The Great Lakes Commission supports the convening of an Interstate Nonpoint Source Pollution Management Conference under Section 319 of the Water Quality Act of 1987 to develop an agreement among the states to reduce the level of pollution from nonpoint sources in order to improve water quality. The conference should involve all appropriate USDA and state agency personnel, directors of the Cooperative Extension Service, EPA officials and representatives from environmental and soil and water conservation groups from the eight Great Lakes States.

   The Commission shall contact the Region V Administrator of the U.S. EPA to encourage the conduct of such a conference and shall provide co-sponsorship services, as appropriate.

   The Commission shall make its contact in November 1987 and continue efforts, as needed, to ensure the conduct of such a conference.

STANDARDS AND CONTROL PROGRAMS

1. The Great Lakes Commission encourages its member states to assume a more aggressive approach to erosion control for water quality management purposes and to reduce the tremendous off-site impacts of sedimentation. In so doing, the Commission advises the states to: incorporate standards for soil erosion into existing farm benefit programs; consider incorporating "cross-compliance" provisions in its applicable legislation; and establish minimum erosion control standards for both rural and urban land use activities. With regard to the latter, the Commission believes that its member states should establish and enforce erosion and stormwater standards in the absence of local controls, and incorporate such standards into state water quality standards.

   The Commission shall convey these views to appropriate legislators, agriculture and water quality officials within its member states and thereafter support their implementation, as appropriate.

   The Commission shall initiate the contact in November 1987.

2. The Great Lakes Commission encourages U.S. EPA to consider establishing sediment guidelines for incorporation into federal and state water quality standards.

   The Commission shall convey this recommendation to the national and regional Administrators of the U.S. EPA and thereafter support implementation, as appropriate.

   The Commission shall initiate the contact in November 1987.

EDUCATION/COALITION BUILDING

1. The Great Lakes Commission shall prepare a concise briefing paper on erosion and sedimentation issues for transmittal to the Great Lakes Congressional Delegation. The Commission shall contact the North Central Office of the National Association of Conservation Districts (NACD) to explore co-sponsorship of a Congressional briefing on related issues of common concern.

   The initial contact shall be made in November 1987, with continuing work toward the conduct of a briefing session as needed.

2. The Great Lakes Commission shall encourage environmental organizations in the Great Lakes Basin to focus additional attention on the linkages between erosion and sediment control and environmental quality. The commission shall encourage interaction and strengthened cooperative relationships between the environmental and soil conservation interests.

   The Commission will use the Interstate Nonpoint Source Pollution Conference to begin the process, and will encourage continued interaction through more informal means in the future.

RESEARCH AND EVALUATION

1. The Great Lakes Commission supports an expanded research program -- at all levels of government -- to address the following issues: quantifying off-site impacts of sedimentation; relationship of soil erosion to water quality and other off-site considerations; quantifying the role of sediment in transport of toxic pollutants; the effects of erosion and sediment control practices on groundwater; the linkages between erosion and sediment control and dredging; alternate disposal of slightly and moderately polluted sediments; and evaluation of current and prospective control programs, including the feasibility of incorporating sediment standards into water quality standards.

   The Commission shall transmit a descriptive listing of such research needs, with rationale, to the U.S. EPA Administrator, Secretary of the U.S. Department of Agriculture, Agricultural Research Service, and other appropriate entities. The list shall further be transmitted to the Science Advisory Board and Council of Great Lakes Research Managers of the International Joint Commission, with special emphasis on Great Lakes water quality considerations.

   The Commission shall urge the various Great Lakes area Sea Grant Programs, Institutes of Water Research; and grant-making foundations to recognize such research needs as their programs are developed and their project selection procedures are implemented.

   The Commission shall initiate this effort in November 1987.

REFERENCES

American Farmland Trust. The Economics of Soil Erosion: A Handbook for Calculating the Cost of Off-site Damage. November, 1986.

Birch, Alfred, Carmen Sandretto and Lawrence W. Libby. Toward Measurement of the Off-Site Benefits of Soil Conservation. Agricultural Economics Report No. 431. Michigan State University: East Lansing, MI. May 1983.

Braden, John B. "Intergovernmental Relations Over Soil and Water Conservation." Illinois Agricultural Economics Staff Paper, University of Illinois, presented at North American Granary Conference on Soil and Water Conservation, St. Paul, MN. October, 1986.

Chesters, Gorden and Linda-Jo Schierow. "A Primer on Nonpoint Pollution." Journal of Soil and Water Conservation 40 (1985), 9-13.

Christensen, Lee A. "Applications of the NRI Data to Inventory, Monitor, and Appraise Offsite Erosion Damage." Soil Conservation: Assessing the National Resources Inventory, Vol. 2. National Academy Press: Washington, D.C. 1986, 237-252.

Clark, Edwin H, Jennifer A. Haverkamp and William Chapman. Eroding Soils: The Off-Farm Impacts. The Conservation Foundation: Washington, D.C. 1985.

Duda, Alfred M. "Environmental and Economic Damage Caused by Sediment From Agricultural Nonpoint Sources." Water Resources Bulletin Vol.21 (1985), No.2, 225-234.

Forster, D. Lynn and Girmai Abrahim. "Sediment Deposits in Drainage Ditches: A Cropland Externality." Journal of Soil and Water Conservation 40 (1985), 141-143.

Forster, D. Lynn, Chris Bardos and Douglas Southgate. "Soil Erosion and Water Treatment Costs." (Draft) Department of Agricultural Economics and Rural Sociology, Ohio State University. June 1987.

Governor's Soil Resources Study Commission. Indiana's Erosion and Sedimentation Situation. Indianapolis, IN. November 1984.

Great Lakes Commission. Great Lakes Soil Erosion and Sedimentation Survey: A Report to the Natural Resources Management Committee of the Great Lakes Commission. Ann Arbor, MI. October 1984.

International Reference Group on Great Lakes Pollution from Land Use Activities (PLUARG). Environmental Management Strategy for the Great Lakes System. Final Report to the International Joint Commission. International Joint Commission: Windsor, Ontario. July 1978.

McCabe, John M. and Carmen Sandretto. "Some Aquatic Impacts of Sediment, Nutrients and Pesticides in Agricultural Runoff." Limnological Research Laboratory, Michigan State University. September 1985.

Mildner, William F. Streambank Erosion in the United States Portion of the Great Lakes Basin. Submitted to PLUARG Task C (U.S. Section) Activity 6. International Joint Commission: Windsor, Ontario. January 1978.

Myers, Carl F., James Meek, Stuart Tuller and Anne Weinberg. "Nonpoint Sources of Water Pollution." Journal of Soil and Water Conservation 40 (1985), 14-18.

National Association of State Departments of Agriculture Research Foundation. "Cooperating for Clean Water: Institutional Issues in Agricultural Nonpoint Source Pollution Control Policy." March 1987.

Phillips, Jonathan D. "The Utility of the Sediment Budget Concept in Sediment Pollution Control." The Professional Geographer Vol.38, No.3, August 1986, 246-252.

PLUARG (see International Reference Group on Great Lakes Pollution from Land Use Activities)

Soil Conservation Service. Facts About ... Illinois: Summary of the 1982 National Resources Inventory. SCS: Champaign, IL.

Soil Conservation Service. Illinois 1982 National Resources Inventory. July 1984.

Soil Conservation Service. Indiana Preliminary 1982-NRI. August 1983.

Soil Conservation Service. Michigan Data 1982 National Resources Inventory. SCS: East Lansing, MI.

Soil Conservation Service. Minnesota 1982 National Resources Inventory. SCS: St. Paul, MN. October 1984.

Soil Conservation Service. National Resources Inventory 1978-79. November 1980.

Soil Conservation Service. National Resources Inventory Pennsylvania Report: Table Summary. SCS: Harrisburg, PA. June 1985.

Soil Conservation Service. 1982 National Resources Inventory: Basic Statistics for New York State. SCS: Syracuse, NY. September 1985.

Soil Conservation Service. Ohio Resources Inventory. March 1985.

Soil Conservation Service. Wisconsin National Resources Inventory 1982. SCS: Madison, WI.

Taff, Steve and C. Ford Runge. "Supply Control Conservation and Budget Restraint: Conflicting Instruments in the 1985 Farm Bill." Staff Paper P86 -33, Department of Agricultural and Applied Economics, University of Minnesota. August, 1986.

Taylor, A.G. "Costs of Sediment in Illinois Roadside Ditches and Rights of Way." Illinois Environmental Protection Agency: Springfield, IL. August 1978.

Taylor, A.G., H. Kuder, D. Sefton, and D. Schaeffer. "Estimated Annual Costs of Sedimentation in Illinois Lakes and Impoundments." Illinois Environmental Protection Agency: Springfield, IL. August 1984.

Taylor, A.G. Memorandum on Sediment Removal Survey - Preliminary Data. Illinois Environmental Protection Agency: Springfield, IL. July 1984.

U.S. Army Corps of Engineers, Buffalo District. "Cuyahoga River, Ohio Restoration Study: Draft Executive Summary." Buffalo, NY. December 1985.

U.S. Department of Agriculture. Revised Draft Program Report and Environmental Impact Statement For a National Soil and Water Conservation Program. USDA: Washington, D.C. 1981.

U.S. Environmental Protection Agency, Region 3, Chesapeake Bay Liaison Office, "Chesapeake Bay Nonpoint Source Report Review." (Draft) April, 1987.

Waddell, Thomas E., ed. The Off-Site Costs of Soil Erosion: Proceedings of a Symposium Held in May 1985. The Conservation Foundation: Washington, D.C. 1986.

Walker, David J. and Douglas L. Young. "Assessing Soil Erosion Productivity Damage." Soil Conservation: Assessing the National Resources Inventory, Vol. 2. National Academy Press: Washington, D.C. 1986, 21-62.