

**GREAT LAKES BASIN PROGRAM FOR SOIL  
EROSION AND SEDIMENT CONTROL**

**ANNUAL REPORT**

**PROGRAM YEAR 2000  
September 1, 1999 through August 31, 2000**

**PRESENTED TO:  
U.S. DEPARTMENT OF AGRICULTURE - NATURAL RESOURCES CONSERVATION SERVICE**

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**NOVEMBER 2002**

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## **I. INTRODUCTION**

Nonpoint source pollution has been identified as a major cause of water quality degradation in the Great Lakes basin. The movement of sediment is a major pathway for the addition of nutrients and toxic chemicals that are bound to soil particles. Beyond water quality degradation, soil erosion and sedimentation reduces agricultural productivity, degrades fish and wildlife habitat, limits water-based recreation, and damages water treatment and transportation facilities.

In late 1987, a regional task force assembled by the Great Lakes Commission released a report titled *Soil Erosion and Sedimentation in the Great Lakes Region*. The report documented the serious nature of the basin's nonpoint source pollution problems, analyzed and interpreted soil erosion and sedimentation data, and presented a series of findings and recommendations that were endorsed by the eight member states of the Commission. Recommendations addressed funding issues, program development, standards and control programs, education/coalition-building, and research and evaluation.

Principal among those recommendations was the establishment of a federal/state "Great Lakes Basin Program" for comprehensive, basin-specific soil erosion and sedimentation control. In offering the recommendation, the task force recognized the Great Lakes system as a "special and unique international resource that deserves special attention and protection." The task force also recommended that a linkage with the federal Clean Water Act, Section 319 nonpoint source pollution control program be made to ensure coordination of activities with the U.S. Environmental Protection Agency (U.S. EPA).

The task force subsequently developed the framework for the Great Lakes Basin Program and, in 1988, secured the unanimous endorsement of the member states of the Great Lakes Commission. The Basin Program became reality in late 1990, when the U.S. Congress appropriated \$1 million through the budget of U.S. EPA Region 5 to support program activities. Funding levels for fiscal years 1991 and 1992 were \$1 million. FY1993 funding was increased to \$1.2 million. In FY1994, the funding source for the Great Lakes Basin Program shifted from U.S. EPA to the U.S. Department of Agriculture-Soil Conservation Service (now Natural Resources Conservation Service). Funding levels for FY1994 and FY1995 were \$250,000. Fiscal year funding levels for 1996, 1997, 1998 were \$350,000. Funding in FY 1999 was \$500,000 and was increased to \$600,000 in FY 2000. Programmatically, the Great Lakes Basin Program has operated on a schedule slightly different from the federal fiscal year since its inception. Therefore, resources and products are reported on a Great Lakes Basin Program Year (PY), which is September 1 through August 31. For this 2000 program year report, the period covered is September 1, 1999 through August 31, 2000.

## **II. PROGRAM GOALS AND OBJECTIVES**

The goal of the Great Lakes Basin Program is to protect and improve the basin's water quality by controlling soil erosion and sedimentation; limiting the input of associated nutrients and toxic contaminants; and minimizing off-site damages to harbors, streams, fish and wildlife habitat, recreational facilities and the basin's system of public works. Objectives associated with the goal, as adopted by the Great Lakes Commission, follow:

1. To achieve special legislative recognition for the water quality problems associated with soil erosion, sedimentation, and the delivery of nutrients and toxic contaminants to the Great Lakes;

2. To provide dedicated, reliable, long-term funding for erosion and sediment control programs in the Great Lakes basin;
3. To coordinate efforts, roles and initiatives among federal, state, and local soil conservation and pollution control agencies and groups in the Great Lakes basin;
4. To recognize sediment as an important pollutant and its role in the transport of chemicals and degradation of habitat and to improve the linkage between erosion control and water quality programs;
5. To support the development and implementation of urban and rural nonpoint source management programs and sediment components of Remedial Action Plans under terms of the U.S.-Canada Great Lakes Water Quality Agreement;
6. To build coalitions and networks to support a Great Lakes Basin Program and to share information and educate groups and individuals with similar interests and goals;
7. To protect and enhance the region's water quality for the benefit of all economic and environmental interests.

As designed, the Great Lakes Basin Program is comprised of three elements: 1) program and technical assistance; 2) demonstration projects; and 3) information and education.

In FY 2000, a sum of \$600,000 was appropriated through the budget of the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS). Of this amount, \$425,000 was applied to the competitive demonstration grants program with \$175,000 being retained by the Great Lakes Commission for regional information, education activities and program administration. Since program inception in FY 1991 through FY 1999, \$5.85 million have been applied to the program, \$3.2 million from U.S. EPA and \$2.65 million from USDA-NRCS. Program oversight is provided by a regional Soil Erosion and Sedimentation Task Force. The task force includes representation from the eight Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin), U.S. EPA, USDA-NRCS, National Association of Conservation Districts (NACD), Conservation Technology Information Center (CTIC), and the International Joint Commission (IJC). Under the leadership and guidance of the Soil Erosion and Sedimentation Task Force, the following activities, tasks and products were completed in PY 2000:

### **III. ACCOMPLISHMENTS**

#### **A. PROGRAM GRANTS -- INSTITUTIONAL ARRANGEMENTS AND PROGRAM COORDINATION**

1. The Great Lakes Commission convened two meetings of the Soil Erosion and Sedimentation Task Force, September 29, 1999 in Erie, Pennsylvania, and March 17, 2000 in Romulus, Michigan to discuss and act upon issues related to the implementation of the Great Lakes Basin Program.
2. At the September meeting, the task force received an update on Great Lakes Basin Program progress and activities; reviewed the draft 2000 request for proposal (RFP) packet; and approved the timeline for RFP mailing, application deadline and proposal review. Great Lakes Commission staff also updated the Task Force on progress in putting Basin Program projects on line on the program website [www.glc.org/basin/projects.html](http://www.glc.org/basin/projects.html).
3. RFPs were mailed to more than 1,100 potential applicants in mid-November 1999. RFPs were sent to state agencies, tribal governments, municipalities, soil and water conservation districts,

- drain commissioners, watershed councils, Resource Conservation and Development area councils, colleges and universities, and conservation and environmental groups.
4. The Commission facilitated the review, ranking and the selection of proposals received by January 19, 2000, in response to the RFP. The Commission received 45 proposals totaling \$912,438. After each task force member prioritized proposals from his/her state, 31 proposals totaling \$613,308 advanced to the full task force for final review.
  5. On March 17, 2000, the task force met in Romulus, Michigan to review and discuss the top proposals and recommend final funding decisions. The task force selected 18 projects to receive \$349,908 in funding. An additional four projects utilizing FY 2000 grant money totaling \$75,137, were selected for funding at the March 14, 2001 meeting of the Soil Erosion task force bringing the total to 22 projects and \$425,045.
  6. In April, the Commission received word from the USDA-NRCS that FY 2001 funds for the Great Lakes Basin Program had been secured. The total amount to be received from NRCS was \$725,000, up \$125,000 over FY 2000. Of this amount, approximately \$500,000 will be designated for the competitive grants program, with the balance directed largely to regional information/education activities and program administration.
  7. Commission staff worked with the project officers of previously funded projects to develop reports for this annual report and articles for the Great Lakes Basin Program newsletter, *Keeping it on the Land*. Slides, photographs, reports, manuals and other materials have been accumulated from project officers to promote and publicize the program.
  8. The NACD Great Lakes Committee convened a meeting on September 30, 1999 in Erie, Pennsylvania in conjunction with the Task Force meeting. There Committee members developed a draft strategic directions document, heard presentations on the Clean Water Act, Section 319 program, and special presentations on Pennsylvania's priority conservation issues, Ontario Farm Environmental Coalition and using the World Wide Web for conservation-related issues.
  9. The NACD Great Lakes Committee also held its spring meeting on March 15 and 16 at the Great Lakes Institute for Environmental Research in Windsor, Ontario. Here the Committee again discussed its goals, priorities, function and structure. Committee members heard presentations on the Great Lakes Water Quality Agreement, discussed a proposed survey of soil and water conservation districts throughout the Great Lakes basin and had presentations on Conservation Ontario and the Section 319 Program. They received updates on various soil erosion and water quality-related programs from representatives of the U.S. Army Corps of Engineers, the U.S. EPA, and the USDA, the Great Lakes Commission and the NACD.

## **B. INFORMATION AND EDUCATION ACTIVITIES**

1. The Great Lakes Commission, through its staff, member states and the Soil Erosion and Sedimentation Task Force, continued to promote the Great Lakes Basin Program through its newsletter, the *Advisor*, and through various information and education activities directed at researchers, local, state and federal resource managers, state legislatures and the U.S. Congress.
2. PY 2000 marked the second year of publication for the regional soil erosion newsletter, *Keeping it on the Land*. During year two, four regular and one special edition were published. Articles featured various erosion control and watershed management programs developed by federal, state and local partners, updates on state and local activities related to soil erosion and sediment control, and features on Great Lakes Basin Program projects recently completed. Circulated to

approximately 2,300 recipients, the newsletter continues to be a valuable tool for communicating information developed under the program.

3. During PY2000, Commission staff were able to make significant progress on efforts to place completed Great Lakes Basin Program projects on-line on the program's web page. Completed projects for Illinois, Indiana, Pennsylvania and Ohio were completed during PY 2000. Work continues on the remaining projects from Michigan, Minnesota, and New York. Each project summary includes photos, charts/graphs, maps and a synopsis of the demonstration, technical assistance or information/education project being featured.

### **C. DEMONSTRATION GRANTS AND SPECIAL PROJECTS**

Approximately \$425,000 was available via the cooperative agreement with the USDA for demonstrations and special projects in PY2000. Twenty-two new projects were awarded grants beginning on June 1, 2000 and four new grants were awarded with a starting date of June 1, 2001. Short descriptions of the twenty two projects awarded at the March 17, 2000 meeting are provided at the end of this report. The descriptions for the other four projects will be provided in the 2001 annual report. Extended project summaries and results are provided for those projects that were ongoing as of Sept. 1, 1999. For information on completed projects, please refer to earlier Great Lakes Basin Program annual reports and to the Great Lakes Basin Program web page: [www.glc.org/basin/projects.html](http://www.glc.org/basin/projects.html).

## **IV. PROGRAM BENEFITS**

Between 1991 and 2000, the Great Lakes Basin Program has provided the resources to gather technical information to help evaluate soil erosion and sediment problems, demonstrate various best management practices (BMPs) for controlling in soil erosion and sedimentation, and educate the public on both the impacts and solutions for controlling soil erosion. Over that period, 158 grants were awarded totaling \$4.62 million. All eight Great Lakes states have received Great Lakes Basin Program support to date (See table below).

#### **GRANTS PROGRAM: TEN-YEAR SUMMARY, 1991-2000**

<u>State</u>	<u>Number of Grants</u>	<u>Total Funding</u>
Illinois	2	\$ 59,500
Indiana	11	\$ 167,453
Michigan	53	\$2,622,530 <sup>1</sup>
Minnesota	22	\$ 471,873
New York	30	\$ 607,271
Ohio	17	\$ 285,691
Pennsylvania	11	\$ 203,298
Wisconsin	12	\$ 218,723 <sup>2</sup>
<b>TOTAL</b>	<b>158</b>	<b>\$ 4,636,339</b>

<sup>1</sup> Includes three separate \$600,000 appropriations (FY 91-93) to the Michigan DNR for the Saginaw Bay Erosion and Sedimentation Control Program

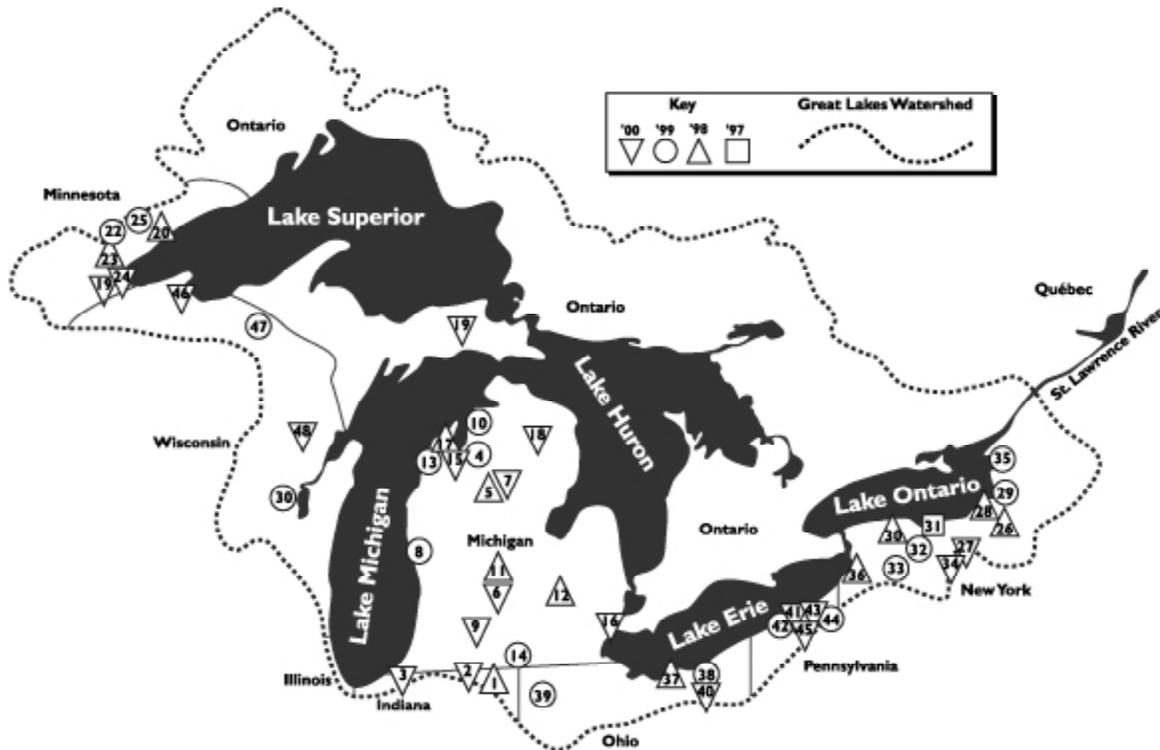
<sup>2</sup> Includes a grant of \$21,368 to the National Association of Conservation Districts (NACD), for 7 soil erosion workshops in the Great Lakes Basin

In evaluating the success of the program, four types of measures are used:

- Tons of soil and other nutrients saved (In some cases the actual pollutant load, e.g. sediment delivery, to streams has been calculated);
- Total acreage involved in some form of soil erosion and sediment control practice;
- Audiences reached; and
- Additional resources that the Great Lakes Basin Program funds have leveraged.

These tools were applied to the 140 projects completed between 1991 and 1999. The 18 projects awarded in this program year have not yet been included in the results measurements. (See Figure One which shows the active projects during PY2000, including the 18 projects that have just begun.)

**FIGURE 1  
GREAT LAKES BASIN PROGRAM  
ACTIVE PROJECTS DURING PY 2000**

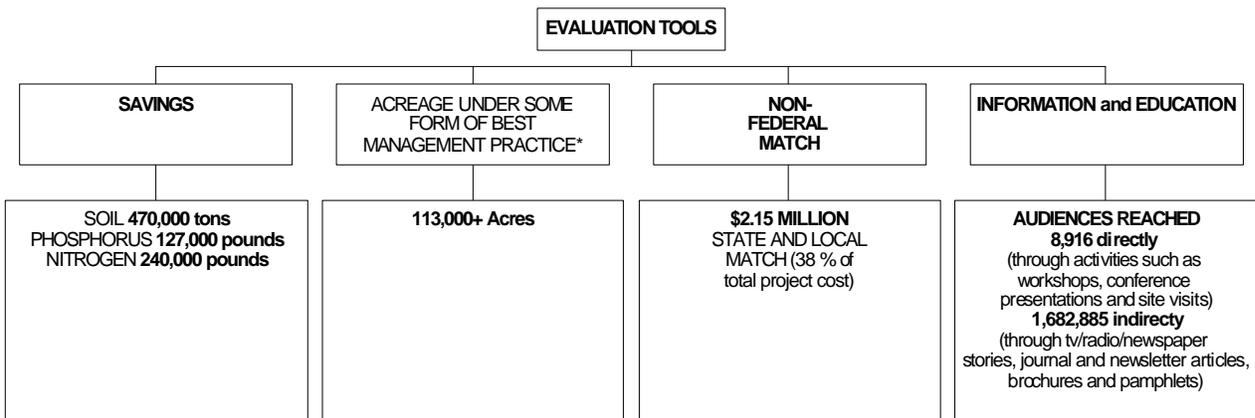


## KEY TO FIGURE ONE

Map #	Project Title	State	Grantee
1	Apollo Erosion Control Project	IN	NE Indiana Solid Waste Mgmt. Dist.
2	Forestry BMP Implementation in Great Lakes Basin	IN	Indiana Department of Natural Resources - Division of Forestry
3	Lower St. Joseph River Vegetative Buffer Project	IN	St. Joseph River Watershed Initiative
4	Agricultural Impact Reduction Program	MI	Michigan Ag. Stewardship Assoc.
5	Agricultural Soil Erosion Reduction Project	MI	Michigan Ag. Stewardship Assoc.
6	Erosion and Sediment Control on Non-Agricultural Property	MI	Clinton County Co. Dist.
7	“Great Lakes Better Backroads” Initiative Phase III	MI	Huron Pines RC&D Council, Inc.
8	Improving Muskegon Lake Water Quality	MI	Muskegon Co. Conservation Dist.
9	Industrial Site Erosion Control with Native Prairie Grass Plantings	MI	Kalamazoo Co. Conservation Dist.
10	Lake Michigan Shoreline Erosion Project	MI	Antrim Co. Conservation Dist.
11	North Branch of the Bad River Adopt-a-Stream	MI	Gratiot Co. Soil Conservation Dist.
12	Protecting Headwater Streams from Soil Erosion	MI	Livingston Co. Drain Commission
13	Psutka Road Crossing Project	MI	Conservation Resource Alliance
14	Sauk River Adopt-a-Stream Project	MI	Branch Co. Conservation Dist.
15	Sediment Reduction on the South Branch of the Boardman River	MI	Grand Traverse Co. Conservation Dist.
16	Soil Erosion Control Practices along Detroit’s Urban Waterfront	MI	Detroit/Wayne Co. Port Authority
17	Soil Erosion and Sediment Control Education	MI	Grand Traverse Watershed Initiative
18	Thunder Bay River Watershed Habitat and Protection Project	MI	Monmorency Co. Conservation Dist./Thunder Bay River Restoration Committee
19	Upper Tahquamenon River Restoration Project	MI	Tahquamenon Sportsman’s Club
20	Baptism River Streambank Stabilization Demo.	MN	Tettegouche State Park
21	Environmental Guidelines for Access Roads and Water Crossings	MN	Minnesota Erosion Control Association
22	Knife River Watershed Education Project	MN	Laurentian RC&D Council
23	Lake Superior Shoreline Protection Project	MN	Lake Superior Assoc. of SWCDs
24	Miller Creek Wetland Inventory and Functional Analysis	MN	South St. Louis County SWCD
25	Multi-Agency GIS Database & Planning Tool	MN	Minnesota Board of Water and Soil Res.
26	Critical Area Seeding — Road Banks	NY	Cayuga Co. Conservation Dist.
27	Erosion and Sediment Control: Cayuga Lake Watershed	NY	Tompkins Co. Conservation Dist.
28	Erosion, Sediment Control Ordinance Pilot Proj.	NY	Wayne Co. Conservation Dist.
29	Management Intensive Grazing in the GL Basin	NY	Cayuga Co. Conservation Dist.
30	Monroe Cty. Highway Water Quality Improvement	NY	Monroe Co. Conservation Dist.
31	Oswego River Erosion Control Project	NY	Oswego Co. Planning
32	Penfield Watershed Mgmt Education Brochure	NY	Town of Penfield
33	Protected Shores: Enhancing Shoreline Property	NY	Ontario Co. Conservation Dist.
34	Road Ditch Geotextile Demonstration Projects	NY	Chemung Co. Conservation Dist.
35	St. Lawrence Rv Shoreline: Biotech Shore Stab.	NY	St. Regis Mohawk Tribe
36	What’s the Dirt	NY	Aquarium of Niagara
37	Black River Stream Bioengineering for Riparians	OH	Lorain Co. Conservation Dist.
38	Chagrin River Sediment and Erosion Mgmt Guide	OH	Chagrin River Watershed Partners, Inc.
39	Sudden Soil Density Change Training Session	OH	Conservation Action Project
40	Urban Stormwater Wetland Sampling Demonstration	OH	Summit Co. Conservation Dist.
41	Cascade Creek Bank Stabilization and Erosion Control	PA	Erie-Western Pennsylvania Port Authority
42	Cascade Creek Sed Control and Educ Proj.	PA	Lake Erie Arboretum at Frontier Park
43	Design and Evaluation of a Sediment Basin Dewatering Device	PA	Albert Jarrett/Penn State University
44	Determination of Sediment Loading Potential	PA	Edinboro University of Pennsylvania
45	Headwaters Park Educational Monitoring Station	PA	Erie Co. Conservation Dist.
46	Demonstration of Streambank Stabilization from Submerged Vanes	WI	Wisconsin Department of Natural Resources
47	Forest Road Building Workshops	WI	Forest Industry Safety and Training Alliance
48	Pensaukee Rv Watershed Riparian Buffer Proj.	WI	Shawano Co. Land Conservation Dept.

As a result of grants completed between PY1991 and PY1998, the total savings from erosion control measures implemented amounts to more than 470,000 tons of soil, more than 127,000 pounds of phosphorus and more than 240,000 pounds of nitrogen over the project period alone. These are very conservative estimates, as many of the BMPs installed will continue to prevent soil from eroding from the land many years after the project has been completed. These savings reflect Great Lakes Basin Program sites only and exclude additional acreage treated by other farmers/landowners throughout the basin influenced by the projects. Many projects funded under the Great Lakes Basin Program have provided the technical background information necessary, through one-on-one communication, site visits, and aerial assessments, for future soil erosion and sediment control projects. Although no soil savings can be attributed directly to this information and technical transfer activity, the potential savings from future projects is enormous. (See Figure 2)

**FIGURE 2  
GREAT LAKES BASIN PROGRAM  
RESULTS MEASUREMENTS  
SEVEN YEAR SUMMARY**



(PY 1991 THROUGH PY1997)

These figures represent cumulative totals over the life of projects funded between 1991 and 1998.

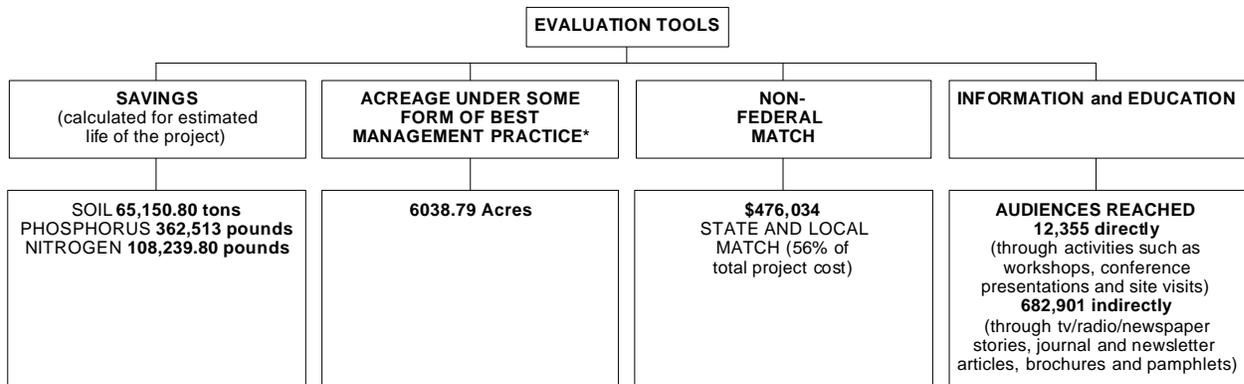
\* For example, buffer strips, conservation tillage, reforestation, streambank planting, toe stabilization and construction site erosion control practices.

During PY1999, grantees began reporting savings over the estimated life of their projects. Twenty-nine demonstration projects completed since then report results over an anticipated project life. Over this period, an estimated 37,363 tons of soil, 84,833 pounds of phosphorus and 53,015 pounds of nitrogen will be saved. As with the projects reported above, these numbers reflect only the acreage directly affected by Great Lakes Basin Program funds and exclude additional areas treated as a result of information and technology transferred from these projects. (See Figure 3)

Topography varies among the eight Great Lakes states, which leads to varying types of BMPs to control soil erosion and sedimentation. Shoreline stabilization, conservation tillage, urban construction, streambank stabilization and filter strips are the most common types of BMPs demonstrated as a result of the program. More than 119,000 acres are under some form of conservation treatment. Over 4,000 acres were added from projects completed during PY2000.

Through the information and education projects reporting during PY2000, more than 9,700 farmers, landowners, students, consultants and other parties had direct contact with technical professionals to solve soil erosion and sedimentation problems through site visits, workshops and tours. More than 438,000 others were informed of the benefits of soil erosion and sediment control through various outreach activities, such as newsletters; brochures/flyers; billboards; displays; newspaper articles; radio; cable TV; and special events such as trade shows, and festivals. Many projects used several of the above methods in community outreach efforts to reduce soil erosion and sedimentation. Target audiences under this program are landowners, farmers, zoning officials, planning officials, students, teachers, developers and contractors, and agribusinesses.

**FIGURE THREE  
GREAT LAKES BASIN PROGRAM  
RESULTS MEASUREMENTS**



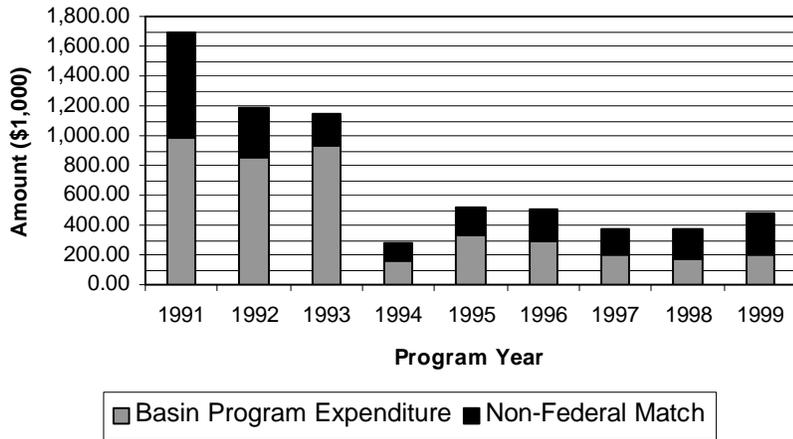
2000 SUMMARY

This figure represent totals over the estimated life of projects completed during PY2000.

\* For example, buffer strips, conservation tillage, reforestation, streambank planting, toe stabilization and construction site erosion control practices.

Another indication of the program's success is the numerous local/state contributions to the individual projects. The Basin Program is acting as a springboard for others to become involved and share their expertise. Since 1994, when the GLC began administering the Basin Program, an additional \$1.16 million (46 percent of total project costs) have been contributed from state and local sources. This is \$536,237.60 more than the minimum nonfederal match required under the program. (See Figure 4)

**FIGURE FOUR**  
**GREAT LAKES BASIN PROGRAM SUMMARY COMPARISON**  
**OF GRANT AWARDS AND NON-FEDERAL MATCH FUNDS**  
 1991 THROUGH 1999\*



\*Note: Basin Program expenditures for PY1991 through PY1993 do not include three \$600,000 non-competitive annual grants to the Saginaw Bay Soil Erosion and Sedimentation Control Program.

## V. FUNDED PROJECTS

### INDIANA

<b>PROJECT TITLE:</b>	<b>APOLLO EROSION CONTROL PROJECT</b>
<b>GRANTEE:</b>	<b>NORTHEAST INDIANA SOLID WASTE MANAGEMENT DISTRICT AND WOOD-LAND-LAKES RESOURCE CONSERVATION AND DEVELOPMENT, INC.</b>
<b>Basin Program Funds:</b>	<b>\$15,000</b>
<b>Nonfederal Funds:</b>	<b>\$19,000</b>
<b>Project Duration:</b>	<b>JUNE 1, 1998 – DECEMBER 31, 1999</b>
<b>Project Type:</b>	<b>TECHNICAL ASSISTANCE</b>
<b>Status:</b>	<b>COMPLETE</b>

#### PROBLEM STATEMENT

An abandoned 18-acre landfill on the Black Creek, in northeastern Indiana's St. Joseph River watershed, is a chronic source of sediment and contaminated leachate. It drains to Fish Creek, which contains the greatest diversity of freshwater mussels in the Great Lakes basin. Further downstream, the St. Joseph River flows into Fort Wayne, Indiana and provides drinking water for over 200,000 people.

#### BACKGROUND

The abandoned well site is not within the jurisdiction of any agency and, as such, offers an opportunity to develop a unique approach to environmental remediation. A new partnership has emerged to address this problem, building trust and a working relationship among grassroots representatives of public, private, local, state and federal groups. This project exemplifies Wood-Land-Lakes RC&D mission of "volunteers working together for responsible stewardship of our natural resources." Local citizens will have a direct impact on water quality by adopting the abandoned, 18-acre landfill site, while all partners participated in developing and implementing the remediation plan.

This project is a component of a larger landfill closure plan. It involves implementing erosion control structures and establishing vegetative cover. The partnership has already assessed current erosion rates, determined the number and type of erosion control structures required and chosen the vegetative practices best suited to the site.

The goal of the Apollo Erosion Control Project is to control erosion, sedimentation and surface runoff from a highly erosive 18-acre site on the Black Creek. Water quality problems associated with these issues will also be addressed. These improvements will be accomplished by establishing a good vegetative cover that will prevent pollutants such as nutrients and contaminated leachate from entering the creek.

This project will positively impact recreation, biodiversity, economic sustainability and human health, as well as encouraging the formation of grassroots partnerships. Improved water quality will

ensure continued use of the creek for water-based recreation and will improve habitat for fish and wildlife populations.

## **ACTIVITIES**

The project team began work on the landfill site in October 1998. The first step was to construct a permanent service road to ensure adequate access to the site. Due to a delay in securing the initial clay cap for the landfill site, project personnel had to secure an additional 12,000 to 12,500 cubic yards of clay to re-cap it. This work also included placing a limited quantity of topsoil on the surface. Approximately 8 acres were hydroseeded with annual and perennial grasses during November. During the summer of 1999, project personnel installed a rip-rap structure with a subsurface tile. They also constructed a sediment retention basin and two grade stabilization structures serving approximately 12 acres of the site. Grade stabilization structures are used to drop runoff water, usually over a short distance, from one elevation to a lower elevation, thereby reducing the rapid erosion that normally occurs at the head of a gully.

## **RESULTS**

Project personnel estimate that the grade stabilization structure will save 7,400 tons of sediment, 37 pounds of phosphorus and 7 pounds of nitrogen over the 20 year life of the structure. Additionally, the seeded area is expected to remain for 50 years and save 24,300 tons of soil, 121 pounds of phosphorus and 24 pounds of nitrogen over its lifespan. The project has been demonstrated to over 6,500 students, lake association members, elected officials, environmental groups and federal, state and local agencies. Project personnel arranged for a site tour, conducted a radio interview and wrote numerous newspaper and newsletter articles.

The initial Great Lakes Basin Program grant received considerable local publicity which encouraged the project group to seek additional funds. Project personnel were able to secure an additional \$121,000 in funding for subsequent work on the project. The Indiana Department of Environmental Quality provided funding to cap the landfill. The senior engineering class at tri-state University donated planning expertise in-kind. A local foundation provided money for groundwater monitoring wells and an additional sum of money has been approved by the Build Indiana fund.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>AGRICULTURAL IMPACT REDUCTION PROGRAM</b>
<b>GRANTEE:</b>	<b>MICHIGAN AGRICULTURAL STEWARDSHIP ASSOCIATION</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 25,000</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 82,787</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 – JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

Nonpoint pollution from agricultural sources such as sediment from cropland, fertilizer, pesticide or bacterial contamination of runoff water from pasturelands pose significant threats to the health of freshwater systems, particularly in Michigan, which has close to one half of the 22 million acres of agricultural land in the Great Lakes basin. Sustainable agriculture can solve some of these problems but it requires a solid knowledge base to be allowed to function.

## BACKGROUND

For decades, agriculture in the United States has been dominated by what some call “industrial agriculture.” By definition, industrial agriculture views the farm as a factory with “inputs”, such as pesticides, feed, fertilizer and fuel, and “outputs,” grain, produce, dairy, meet and poultry. The goal in industrial agriculture is to increase yield and decrease costs of production through monoculture, the separation of animal and plant agriculture, and by exploiting economies of scale. Farms where monoculture is practiced inevitably invite pests and usually require heavy applications of insecticides and herbicides to keep them in check. In time, these chemicals leach into the water table and contribute to a state of “nonhealth” within the region’s freshwater ecosystems.

A sustainable approach to agricultural production makes sense environmentally, economically and ethically. According to research conducted by Michigan State University Extension, Union of Concerned Scientists in Cambridge, MA and grass-roots organizations such as the Michigan Agricultural Stewardship Association (MASA) sustainable agriculture has been shown to provide high yields without destroying the environment or undermining current productivity standards within the United States. It is clear that farmers who take a sustainable approach substitute knowledge for pesticides and fertilizers, enrich the soil producing healthy plants resistant to disease, thereby saving money and protecting the environment.

The goal of this project was to provide educational and trial opportunities in sustainable agriculture practices to farmers and agriculture professionals who directly or indirectly impact the health of Michigan’s fresh water ecosystems. This was done through educational meetings and seminars, the publication and distribution of articles on sustainable farming and through funding sustainable farming demonstration projects. This project sought to increase policy maker’s knowledge about the agricultural influence on the Great Lakes basin’s fresh water ecosystems.

## ACTIVITIES

MASA conducted nine educational meetings for farmers and agricultural professionals, which consisted of field days at various farms and orchards demonstrating sustainable farming techniques. Some of the techniques demonstrated included the elimination of pesticide use in a cherry orchard

and the use of permanent crops to eliminate the need for soil cultivation. Pollution prevention specialists from agencies throughout the Great Lakes basin attended a tour that showcased an alternative agricultural model. In addition, MASA selected 17 on - farm research and demonstration projects for funding in 1999-2000, five of which specifically addressed soil quality issues that will reduce agricultural erosion and associated pollution. MASA also provided testimony to Michigan's Senate Agriculture Preservation Task Force on the benefits of an agricultural system that reduces agriculture's impact on the Great Lakes. MASA serves the Michigan Organic Advisory Council, the Great Lakes Basin Whole Farm Planning network, Michigan Lakes and Streams Association, and the Lake Michigan Forum. MASA also conducted an inventory and assessment of agriculture in the Lake Michigan basin for the Lake Michigan Forum.

## **RESULTS**

Approximately 380 farmers, agricultural professionals and specialists attended a total of nine educational meetings. Summaries of the 17 on - farm research and demonstration projects were featured in Michigan's *Farm and Country Journal*, which is distributed to 10,000 people. The five on - farm research and demonstration projects that specifically addressed soil quality issues produced research that will be helpful in reducing agricultural erosion and associated pollution. Several of MASA's demonstration farms were featured locally or by Michigan State University during educational meetings unrelated to this project. MASA provided information packets to six legislators in Michigan and provided a tour for 60 pollution prevention specialists from the Great Lakes region. A total of 67,000 farmers and policy makers were reached during the grant period through the educational meetings. In addition, a projected 23,000 farmers will be reached beyond the grant period. The Michigan Lakes and Streams Association requested MASA present this project at its Annual Meeting in April 2000, providing an opportunity to reach some of Michigan Lakes and Streams Association's 120,000 members.

Best management practices implemented as a result of this project include 220 acres of filter strips, 420 acres of conservation tillage, 1100 acres of vegetative stabilization, and 220 acres have been established in permanent cover. Project personnel estimate that 320 tons of soil, 3,200 pounds of phosphorus and 640 pounds of nitrogen will be saved over the lifetime of this project.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>AGRICULTURAL SOIL EROSION REDUCTION PROJECT</b>
<b>GRANTEE:</b>	<b>MICHIGAN AGRICULTURAL STEWARDSHIP ASSOCIATION</b>
<b>Basin Program Funds:</b>	<b>\$ 15,000</b>
<b>Nonfederal Funds:</b>	<b>\$ 15,320</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 – MARCH 1999</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

Michigan has close to one half of the 22 million acres of agricultural land in the Great Lakes basin and, as such, Michigan farmers are responsible for a significant portion of the agriculturally induced soil erosion and resulting water quality degradation within the basin. The challenge is to retain the valuable agricultural base and improve the environmental quality of the basin by empowering Michigan farmers to reduce nonpoint source pollution from agricultural erosion.

## BACKGROUND

According to the Great Lakes Commission's *Agricultural Profile of the Great Lakes Basin* (1996) there are over 22 million acres of agricultural land in the Great Lakes basin. Michigan reported 10.7 million agricultural acres under the 1992 Census of Agriculture. It is therefore possible that Michigan farms contribute up to one half of the basin's agriculturally induced soil erosion. Agricultural erosion is significant because it carries associated nutrients, phosphorus and nitrogen, as well as pesticides and herbicides, which negatively impact water quality. In addition to degrading water quality, soil erosion and sedimentation reduce agricultural productivity; degrade fish and wildlife habitat; limit water-based recreation; and damage water treatment and conveyance facilities.

Recently, the Michigan Agricultural Stewardship Association (MASA) undertook a needs assessment which identified specific topic areas that MASA members believed required research and investigation. These included soil health/tilth, integrated crop management, biological pest controls, whole farm planning, rotations, alternative nitrogen sources, reduced herbicide systems, manure use and applications, alternative tillage systems and streambank protection. In an initially unrelated exercise, Dr. George Bird of Michigan State University (MSU) assembled a group of individuals to develop a series of training modules for the Sustainable Agriculture Research and Education Professional Development Program. The training modules developed by the MSU work group closely paralleled the issues identified during the MASA exercise and, when coupled with the Great Lakes Basin Agricultural Profile, suggested an erosion control focal point. Soil erosion can be reduced through demonstration and education initiatives directed toward sustainable production.

## ACTIVITIES

MASA developed a demonstration/education delivery system including on-farm research, education and community-based dissemination. MASA chose eleven farms on which to conduct relevant research or demonstrate practices to enhance soil quality, reduce the need for chemical inputs or reduce sediment loading. Among these were trials to determine the benefits of various types of clover cover crops, discover the quality of compost made from municipal yard waste, including assessment of residual herbicides and insecticides, and determine the long-term effect of different fertilizer treatment on garden crops. Other projects included an attempt to provide all crop fertility requirements organically rather than using synthetic fertilizers and a project which strip cropped

soybeans and corn to determine if mixing grass and legume cover improved fertility and soil biodiversity. Factors affecting soil quality were tested in several experiments including a bare ground test, ground cover in orchards, and the application of wood ash diverted from landfills. Soil health indicators in the form of soil nematodes and arthropods were also tested. Finally, two farms participated in a unique sediment and phosphorus reduction project.

## **RESULTS**

The Kellogg Biological Station cosponsored three education meetings in different Michigan cities. These meetings emphasized promoting soil quality as a way to reduce soil erosion and contamination. In addition, MASA produced seven monthly newsletter inserts to the *Farm and Country Journal* which reaches 6,000 readers each month. An additional 20,000 copies of the July 1998 issue were distributed through the Ag Expo trade show at Michigan State University, making for a total readership of 62,000. MASA also mailed 11,000 farmers a summary of the 11 projects as a mechanism for promoting better soil quality.

Best management practices implemented as a result of this project include 400 acres of improved soil quality, 200 acres of conservation tillage, and 1740 acres of vegetative stabilization. Project personnel estimate that 90 tons of soil, 900 pounds of phosphorus and 180 pounds of nitrogen will be saved as a result of this project.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>IMPROVING MUSKEGON LAKE WATER QUALITY THROUGH PROPER LAND USE IN THE RYERSON CREEK WATERSHED</b>
<b>GRANTEE:</b>	<b>MUSKEGON CONSERVATION DISTRICT</b>
<b>Basin Program Funds:</b>	<b>\$ 24,654 (APPROVED)</b>
<b>Nonfederal Funds:</b>	<b>\$ 13,694 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>APRIL 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Ryerson Creek, in the Muskegon Lake watershed, is rapidly urbanizing. The associated increase in impervious surface within the watershed has contributed to increased flows during storm events and led to streambank erosion problems along the creek. The Ryerson Creek watershed lacks a stormwater management plan and the appropriate government action, in the form of ordinances, zoning and BMP implementation to effectively manage sedimentation from streambank erosion and subsequently improve water quality in Muskegon Lake.

## BACKGROUND

The 1,993 acre Ryerson Creek watershed is representative of the rapidly developing urban growth area around Muskegon Lake. Ryerson Creek has a moderate amount of streambank channel erosion occurring estimated to yield approximately 200 tons of sediment load to Muskegon Lake per year. Stormwater flows from increased impervious surfaces is evidenced by litter trapped in brush 3-4 feet above the normal stream channel flows. Streambank erosion was not a problem in this watershed 10 years ago, but today six eroded sites caused by stormwater flows have been identified.

The Muskegon Lake Public Advisory Council (PAC) and the Michigan Department of Environmental Quality have identified urban development, such as that occurring along Ryerson Creek, as a significant contributor to the sediment load of Muskegon Lake, an identified Area of Concern. In addition, Phase II Stormwater Regulations under the Clean Water Act require a comprehensive approach to stormwater management by smaller communities, such as Muskegon. Therefore, developing a stormwater management plan for Ryerson Creek addresses several unmet needs in regional environmental management.

The goal of this project is to improve the water quality of Muskegon Lake by decreasing streambank erosion on Ryerson Creek. The Muskegon Conservation District seeks to form a coalition of federal, state and local agencies and units of government to assist in developing a stormwater management plan and to increase awareness and participation in water quality issues among local elected officials and citizens. This project will produce a template for improving water quality and managing rapidly urbanizing watersheds that will be shared with locally adjacent watersheds to encourage others to engage in initiatives to restore and protect the water quality of Muskegon Lake.

## ACTIVITIES

The Muskegon Conservation District worked with a coalition of federal, state and local governments, agencies and public advisory groups in order to develop a stormwater plan for the Ryerson Creek watershed. As a first step, the Conservation District formed the Ryerson Creek Technical Team to provide input for the stormwater plan. Team members included representatives from the Conservation District, the U.S. Department of Agriculture - Natural Resources Conservation Service (NRCS), elected officials and staff from Muskegon Township, Eggleston Township, and the City of Muskegon, and the Muskegon County Drain Commissioner. Michigan Department of Environmental Quality's Surface Water Quality and Land and Water Management Divisions (MDEQ) provided additional technical support and advice.

The Technical Team, with assistance from Westshore Consultants and Grand Valley State University, developed a stormwater management plan that addresses both water quantity and water quality concerns. They utilized a Geographic Information System (GIS) to combine watershed boundaries, land use, soil types and percentage of impervious surface to give an accurate picture of historic, current and possible future watershed development. In addition, the Michigan Department of Environmental Quality provided hydrologic analysis of runoff volumes and peaks for the watershed using a U.S. Army Corps of Engineers' hydrologic modeling system.

NRCS staff designed bio-engineering techniques to be used on three erosion sites along Ryerson Creek. Project personnel provided information about the project to five teachers and their students. Project personnel have invited them to participate in restoring several erosion sites along Ryerson Creek and to present water quality and land-use information at an upcoming public meeting.

The resulting *Stormwater Management Plan for the Ryerson Creek Watershed, Muskegon County, Michigan* is comprehensive in scope. It provides an overview of the watershed that examines the impact of land use and urbanization, and outlines local governance arrangements. The plan reviews the hydrologic analysis and identifies nine critical areas that must be addressed through an integrated approach to achieve effective stormwater planning.

## RESULTS

The project has had several immediate applications as well as promising significant future benefits. The Technical Team developed and delivered a public workshop on riparian landscaping and water quality monitoring techniques for the benefit of wildlife and water quality. In conjunction with the project manager, the Technical Team also gave presentations at three meetings with the public and local officials to support the development of ordinances to implement the stormwater management plan. An additional three forums, developed for local units of government in Muskegon County, resulted in the creation of a Muskegon County Stormwater Committee which is investigating MDEQ's voluntary stormwater permit.

The project team also developed fact sheets and articles on the stormwater project which were distributed to interested local groups and printed in two local newsletters with a combined distribution of 20,000 in Muskegon County. In addition, the project team demonstrated bioengineering techniques for restoring eroding sites along the creek. To date they have restored two sites, covering approximately 1.5 acres, and will use similar techniques to restore a third. The project manager estimates 141 tons of soil will be saved over the life of the project.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>LAKE MICHIGAN SHORELINE EROSION CONTROL PROJECT IN ANTRIM COUNTY</b>
<b>GRANTEE:</b>	<b>ANTRIM CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 23,422</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 31,228</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 - JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

Antrim County is one of the fastest growing regions in the state. During the summer, the county's population of 12,000 permanent residents doubles. These two factors are resulting in an increased use of public access sites. Human impacts in the form of increased sediment, nutrients, bacteria and chemicals are being deposited into Lake Michigan, resulting in degradation of water quality. Many communities and townships do not have the physical and financial resources to provide adequate upkeep or to police public access sites.

## BACKGROUND

Hundreds of public access sites are located throughout the Great Lakes region and unfortunately they contribute thousands of tons of sediment and other pollutants into the Great Lakes. Antrim County's public access sites have been identified and documented by the Antrim Conservation District. One hundred and fifty sites were visually inspected for evidence of nonpoint source pollution.

This project will serve as a model to demonstrate the successful cooperation of various groups and agencies to solve water quality degradation and demonstrate simple cost-effective solutions using proven erosion control techniques. The Antrim Conservation District will strive to build partnerships by introducing to the community a new innovative approach to the protection of public access sites, with the "Adopt-A-Public-Access-Site" (APAS) program. Part of the program will be to utilize innovative stormwater techniques such as rain gardens, which will control stormwater runoff and provide wildlife habitat.

## ACTIVITIES

District staff with the help of partners, identified the five most degraded public access sites in Antrim County. In order to prepare the sites, local school groups and other organizations participated in a volunteer clean up day. The Road Commission assisted and donated equipment for completing the stabilization of all of the sites. The project team utilized bioengineering practices such as rock rip-rap and installed low growing shrubs and bushes to stabilize the soil and provide habitat, food source, and travel routes for a variety of animal species. They improved parking lots and graded them away from the lake and installed fences and/or stairs where necessary to control the impacts of foot traffic. Finally, District staff installed signs explaining the project and educating the public on the importance of protecting the County's resources.

District staff purchased native plants, received donated plants and planted them according to direction from the Michigan Association of Conservation Districts' Native Plants program. They also scheduled an initial meeting to start the APAS program. Groups who adopt an access site will

be responsible for trash pickup and alerting the involved agencies of any erosion problems that may occur. Two residents have agreed to adopt access sites for which signs are being completed. A group of young students will revisit all the sites and document trash and tourist traffic.

## **RESULTS**

Under this grant, project staff, the Road Commission and volunteers significantly improved five public access sites on Lake Michigan, stabilizing a total of one acre of lakeshore with vegetation and improving 2.45 acres of lakeshore. The Road Commission donated time and equipment for placing rock rip-rap and improving public access road beds. Over the estimated 100 year life of this project, District personnel estimate that 1,350 tons of soil, 45,000 pounds of phosphorus and 45,000 pounds of nitrogen will be saved. Through newspaper articles, radio announcements and township meetings, an estimated 100,000 residents, public officials and vacationers were made aware of this project and the importance of reducing inputs of soil, nutrients and other chemicals into the Lake Michigan.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>MICHIGAN WATER TRAIL</b>
<b>GRANTEE:</b>	<b>MICHIGAN DEPARTMENT OF AGRICULTURE</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 23,850 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 99,500 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>CANCELED AT REQUEST OF GRANTEE</b>

## PROBLEM STATEMENT

Soil erosion and sedimentation are major pollution sources that reduce water quality throughout Michigan. Decisions made by the general public such as which pesticides to use, has a significant impact on ecosystem health. Yet the public lacks an understanding of the role of sediment as a pollutant as well as how their actions affect the environment.

## BACKGROUND

It is estimated that 24 million tons of soil are eroded in Michigan each year. This eroded material must either be removed at an enormous monetary expense to society or allowed to continue to degrade surface waters. This disrupts commerce and recreation, reduces property values, and destroys native wildlife habitat. In addition to affecting lakes, streams, rivers, drains, and wetlands by depositing sediment in these water bodies, erosion also delivers fertilizers and pesticides, which are carried with sediment particles, into these water bodies.

While remediation as a corrective action to erosion and sedimentation is an option available to society, it is prohibitively expensive. It is far less expensive to reduce, control and prevent erosion and sedimentation in the first place. Technologies exist which can control, reduce and/or eliminate erosion and sedimentation in a wide variety of applications and settings, including rural, suburban and urban areas. Widespread implementation of some of these practices, such as water control structures or sediment retention basins, is hindered by their cost, which must be borne by the entire community or offset with cost-share monies. However, the implementation of other, less expensive, technologies, such as filter strips, proper shoreline property management and construction site erosion control measures, is often restricted by both a lack of understanding about sediment's pollutant properties as a pollutant and low-cost erosion prevention measures.

The purpose of this project is to increase the general public's understanding of the role of sediment as a pollutant and how individual actions affect the environment. The Michigan State Fair, which receives an average of 400,000 attendees a year, is an excellent location for an interactive learning environment that will provide fair-goers with the information and skills needed to make wise decisions and take responsible actions.

A one-half acre watershed simulation will be developed at the Michigan State Fairgrounds in Detroit, Michigan to provide fair-goers with information about controlling soil erosion in a variety of settings from urban to agricultural. Learning will primarily be hands-on with some subject-specific group presentations and workshops directed toward changing people's attitudes about everyday decisions and changing their behavior.

## **ACTIVITIES**

The Michigan Water Trail has generated a tremendous amount of local interest and support. The original plans for the Water Trail have grown to include a wider variety of interactive and educational stations along the pathway. Due to the increasing complexity of the project, the original time frame for completing the project is no longer feasible. At the Michigan Department of Agriculture's request, the Michigan Water Trail grant has been canceled.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>NORTH BRANCH OF THE BAD RIVER ADOPT-A-STREAM PROGRAM</b>
<b>GRANTEE:</b>	<b>GRATIOT COUNTY SOIL CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 4,552.50</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 2,284</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 – DECEMBER 31, 1999</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

Despite inroads into watershed management in the Bad River, traditional streambank erosion continues to be a problem, especially in areas inaccessible by large machinery. In order to address problems in these areas, a large number of dedicated individuals willing to do the restoration work must be energized to undertake this initiative. This project benefitted the river by reducing streambank erosion and associated sedimentation, while providing an opportunity for hands-on education about the causes, effects and techniques for reducing sedimentation.

## BACKGROUND

The North Branch of the Bad River is a third order stream located within the eastern headwaters of the Saginaw River/Bay Area of Concern. The North Branch of the Bad River watershed includes over 67,000 acres, with 93 percent of the land use being intensive agriculture. The river is an important contributor to the Shiawassee National Wildlife Refuge, a significant regional wetland habitat for migratory birds. The river also has an impact on the water quality of the Saginaw River which is an important economic benefit to the area. Reduction of streambank erosion and the associated sedimentation will greatly benefit all these areas. In 1993, the Michigan Department of Natural Resources conducted water quality tests on the watershed which indicated that sediment was the primary pollutant impairing several functions of the river ecosystem.

The Gratiot County Conservation District has been very active in trying to resolve problems relating to soil erosion and sedimentation in the Bad River watershed. Among other initiatives, the district has promoted wetland restoration and the installation of over 20 miles of filterstrips and encouraged the adoption of no-till farming. Despite these efforts, traditional streambank erosion is still causing a considerable amount of sedimentation in the watershed. The district will develop an Adopt-a-Stream program to energize a critical mass of volunteers who will use bioengineering techniques to address erosion problems in areas inaccessible by heavy machinery.

## ACTIVITIES

The Gratiot County Conservation District coordinated a training session for volunteers on tree revetment design and logjam removal. The trained volunteers worked hand in hand with project personnel removing nine logjams that were causing streambank erosion and adopting twelve sections of streambank, which they revegetated using live plantings of willow, red osier dogwood and highbush cranberry. The project manager spoke to a St. Charles High School biology class about the effects of sedimentation on rivers, lakes and wetlands.

## RESULTS

Volunteers adopted a total of 3.5 miles of streambank, clearing them of logjams and revegetating them. Over the estimated life of this project, project personnel estimate that 23.4 tons of soil, 27 pounds of phosphorus and 54 pounds of nitrogen will be kept on the land. Additionally, flooding in the North Branch of the Bad River and damages from the floodwaters will be reduced.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>PROTECTING HEADWATER STREAMS FROM SOIL EROSION AND SEDIMENTATION THROUGH STORMWATER MANAGEMENT, EDUCATION, COOPERATION AND INNOVATIVE POLICY</b>
<b>GRANTEE:</b>	<b>LIVINGSTON COUNTY DRAIN COMMISSIONER</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 14,000 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 15,209 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 –</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Livingston County anticipates a population growth rate of 90 percent between 1990 and 2020, an expansion from 115,645 to more than 219,000 people. The construction phase of the associated development can be expected to contribute 65 to 70 tons of soil per acre to nearby water bodies annually if not properly managed. The Livingston County Drain Commissioner intends to develop a model program to provide an understanding of soil erosion and stormwater impact on chemical transportation and habitat degradation. The project will be directed at residents and the development community, including state and local officials, land owners, builders and contractors.

## BACKGROUND

Livingston County contains the headwaters of three Great Lakes tributaries: the Shiawassee River, which drains to the Saginaw River and eventually to Saginaw Bay; the Red Cedar and Looking Glass rivers which both empty into the Grand River, thence to Lake Michigan; and the Huron River which drains to Lake Erie. These headwaters provide significant aquatic habitat supporting a diversity of aquatic species. For instance, the Livingston County portion of the Huron River provides habitat to wavy-rayed lamp mussels, eastern sand darters, snuffbox and gravel pyrg, all of which are endangered, threatened or species of concern.

The construction phase of development, if unchecked, can generate as much as 70 tons of soil per acre to nearby water bodies annually. Associated impacts of construction include changes to stream hydrology and morphology, loss of existing stormwater storage capacity, loss of wetlands, and an increase in impervious surfaces resulting in an increase in the amount and velocity of runoff. These changes lead to an increase in the magnitude and frequency of severe flood events, bankfull flooding, ongoing streambank disturbance and erosion, channel widening and incising, and sediment loads, and the elimination of pools and riffles. All of these contribute a greater amount of fines and other suspended material downstream leading eventually to the Great Lakes.

The Livingston County Drain Commissioner has broad regulatory authority over soil erosion and sedimentation control as well as stormwater conveyance through state law and county and local ordinance. This makes the commissioner ideally situated to influence the current infrastructure for nonpoint source pollution activities in the county and to strengthen existing erosion and sedimentation control programs.

## ACTIVITIES

The Drain Commissioner invited volunteers from three key stakeholder groups — builders/developers, environmental/agricultural interests and government officials — to participate in an initial meeting where he introduced the issues of concern. Thirty-three attendees took part in the meeting in which the Drain Commissioner outlined the problems, goals and expectations associated with the project and explained the importance of a healthy headwater system to overall riverine health. Participants identified the unique and valued aspects of Livingston County as well as perceived challenges to these amenities. After the meeting, project personnel compiled the results and sent them to the participants. Following the initial stakeholder meeting, thirty participants volunteered to sit on the Technical Advisory Committee (TAC). The Drain Commissioner prepared *TAC Notebooks* for each committee member which brought together the existing county and local ordinance, sample ordinances from other counties and other articles and references of potential interest and application. The TAC participated in a total of nine meetings in which they commented on existing ordinances and provided direction for the developing stormwater management and erosion control program. At the same time, the Drain Commissioner polled various Great Lakes enforcement agencies requesting summary information of drainage and sedimentation control policies. Project personnel incorporated comments made by the TAC and data obtained from Great Lakes enforcement agencies in a draft soil erosion and sedimentation control program for the consideration of the TAC. The Drain Commission published the draft document and presented it to several stakeholder groups, including the Michigan Association of County Drain Commissioners, the Home Builders Association and local township officials. The Drain Commissioner will continue to work with the County Board to establish the soil erosion and sediment control policies as part of an official County ordinance.

## RESULTS

The Drain Commission formed a Technical Advisory Committee composed of key stakeholders that helped research and draft *Livingston County's Procedures and Design Criteria for Stormwater Management Systems and Soil Erosion and Sedimentation Control Program*. The document includes an introduction which clearly demonstrates the importance of the rules and program and their role in protecting the integrity of Livingston County's Great Lakes headwater tributaries. Throughout the procedure development process, project personnel interacted with approximately 75 developers, local elected officials, environmental groups and engineers, raising awareness of the connection between development and natural resources integrity and the potential for natural resource degradation. Ultimately, tens of thousands of people will be affected as the policies influence the site development activities performed by developers. Implementation of the new policies is scheduled to begin by November of 2001, following publication of the ordinance according to State law.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>PSUTKA ROAD CROSSING PROJECT</b>
<b>GRANTEE:</b>	<b>CONSERVATION RESOURCE ALLIANCE</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 25,000 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 19,000 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

The Betsie River, located in northwestern Michigan, is a state-designated Natural River highly utilized for salmon and steelhead fishing, and other outdoor recreation opportunities. Unfortunately, many sites along the river are experiencing severe erosion. The Psutka Road crossing in the Betsie River watershed has been a severe erosion site for many years, and a priority repair project to the Betsie River Watershed Restoration Committee.

## BACKGROUND

An estimated 75 to 100 tons of sand erode from Psutka Road crossing on an annual basis. The stretch of Betsie River located downstream of this crossing and reaching to the next crossing is heavily loaded with sand. The river in this section is fairly wide with few deep holds and gravel runs for optimal fish habitat. Spawning beds are buried and the river is often shallow, thus increasing water temperatures. Both the north and south approaches to the Psutka Bridge have been actively eroding for the last ten years as rain, snow melt and vehicle traffic carve deep crevices into the road bed and shoulders. The crossing is popular among canoeists and anglers for access to the river, and trampled pathways on either side of the bridge are evident.

The primary goal of this project is to improve the water quality and fish and wildlife habitat of the Betsie River by addressing the water quality threat caused by erosion at the Psutka Road Crossing. Several agencies interested in the Betsie River will be involved an on-the-ground erosion control project at Psutka Crossing.

Methods to be implemented in this project include: paving the approaches to Psutka Road to prevent further erosion of the road and shoulders; constructing diversion outlets to control water flow; and slowing the velocity of the water and allowing sediment to settle before runoff can reach the river.

## ACTIVITIES

The project team held an initial meeting at the Psutka River Crossing to agree upon construction items and a timeline for project completion. During the duration of the project, four Watershed Restoration Committee meetings were held in which the project was discussed and construction blue prints were approved. The Manistee Road Commission (MCR) proceeded with the project, installing a greater number of best management practices (BMPs) than initially planned. The MCR regraded, paved and curbed the Psutka Road approaches to the channel (1,500 feet) and established six diversion outlets complete with rock rip rap along both approaches to control runoff. Curbing helps divert water flow into diversion outlets and away from the low point on the bridge. They provided parking on the left approach so that cars will not tear up the vegetation and soil on the

embankments. Additionally, the MCR revegetated some areas, replaced a culvert, and installed ditching and check dams to accommodate a spring in the clay soils on one approach to the bridge.

Once the project was completed, an on-site meeting and site tour was held for all project partners and local media to showcase the BMPs installed. Copies of the *Great Lakes Better Backroads Guidebook - Clean Waters by Design* (by the Huron Pines RC&D Council) were passed out at the meeting and those present reviewed the BMP sections implemented at the Psutka Road Crossing. Additionally, a mailing detailing the project and on-site tour was sent to approximately 350 people.

## **RESULTS**

This project is an example of a watershed-wide perspective and community-based approach to solving water quality and erosion problems that can be shared with community members, restoration committee partners and other road commissions. The working relationship established with the Manistee County Road Commission as a result of this project can be applied to other watersheds that overlap Manistee County. Most significantly, the project helped maintain the active operation and participation of the Betsie River Watershed Restoration Committee by giving them a focus project for a year and has uplifted their spirits because visible results were produced. Future improvements include repairing or replacing the Psutka Road Bridge. The Committee is working with the Conservation Resource Alliance to access Clean Michigan Initiative monies to help fund the repairs or replacement.

As a result of this project, approximately 3,375 tons of soil, 33,750 pounds of phosphorus and 67,500 pounds of nitrogen will be saved over the project's estimated 35 year life-span. Improvements have been made to fish and wildlife habitat, water temperatures, water quality, recreational use and aesthetics.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>SAUK RIVER ADOPT-A-STREAM PROJECT</b>
<b>GRANTEE:</b>	<b>BRANCH COUNTY CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 18,200</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 19,500</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 - JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

The Sauk River in Branch County, Michigan has nonpoint source water quality problems due to soil erosion and sedimentation from cropland and streambank erosion and from road and rail crossings. A lack of community awareness of these problems has meant little or no action has been undertaken to combat soil erosion and sedimentation, resulting in a gradual decline in water quality within the project area.

## BACKGROUND

This project was designed to allow the community in the watershed, in particular students, to become actively involved in a project on the Sauk River through the implementation of an Adopt-A-Stream program. Project personnel wished to see better coordination and linkages between erosion control and water quality programs in the watershed. They also wished to promote a public understanding of the importance of sediment as a pollutant and its role in chemical transportation and habitat degradation.

In addition to the Branch County Conservation District, which served as the sponsoring agency, project partners included the U.S. Department of Agriculture's Natural Resources Conservation Service, two local school districts, local government agencies, the County Board of Commissioners and the Drain Commissioner, and the Michigan Department of Environmental Quality which supports an ongoing Clean Water Act, Section 319 project in the Sauk and Coldwater River watersheds.

## ACTIVITIES

In July 1999, several Branch County Conservation District employees and local educators received training in stream monitoring at the Kellogg Biological Station through Michigan State University Extension. The trained personnel then surveyed the Sauk River, identifying areas in need of clean up and dividing the river into eleven sections for adoption by participating community groups.

The district administrator attended a number of community group meetings to inform potential partners about the Adopt-A-Stream opportunity on the Sauk River. Eventually a number of community groups, ranging from the Rotary and Masonic Lodge to school groups, adopted a portion of the Sauk River. For its section of the river, each group agreed to pick up trash and litter twice a year, maintain access to the river and provide the district with a brief report on cleanup efforts to aid documentation and reporting. In addition, some groups agreed to plant grass, trees and shrubs on eroded streambank sites to provide restoration support. After obtaining permission to access the river from landowners, the district organized seven cleanup days.

In order to assess the impact of the cleanup, the project team arranged for water quality surveying to occur. District staff members completed the initial survey and sent it to a State of Michigan laboratory prior to beginning the cleanup. In addition, a Quincy High School teacher trained 60 students in water analysis. The students began testing water quality at four sites in two mile intervals during the fall of 1999 as part of on-going water quality monitoring efforts.

## **RESULTS**

Eleven community groups participated in the initial cleanup and committed to ongoing stewardship of their section of the Sauk River. In celebration of the Sauk River cleanup, the Adopt-A-Stream program partnered with the Hospice Duck Committee to hold the Sauk River Fest in July 2000. An estimated 1,000 people enjoyed events such as a canoe race and games.

Dissemination of public information about the Adopt-A-Stream program was aided by Quincy Community schools. Teachers and students helped to develop a video and website ([www.quincy.j12.mi.us/sauk](http://www.quincy.j12.mi.us/sauk)) to convey information about the project. The video will be available to the local cable public access channel to publicize the effort as well as to program partners to enable them to spread the word. The website was linked to the Friends of the St. Joe River Association website because of this group's interest in the program. Additional public information was conveyed through newspapers, radio shows and informational signs posted on the river.

In addition, partnership with the Section 319 project enabled two eroded streambank sites on the river to be restored, totaling 2,400 square feet. Project personnel estimate that a total of 315 tons of soil will be saved from these sites. Grass and wildflower planting that occurred during cleanup helped to reduce erosion and enhanced wildlife habitat.

# MICHIGAN

<b>PROJECT TITLE:</b>	<b>SOIL EROSION AND SEDIMENT CONTROL EDUCATION, GRAND TRAVERSE BAY WATERSHED</b>
<b>GRANTEE:</b>	<b>GRAND TRAVERSE BAY WATERSHED INITIATIVE (GTBWI)</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 7,105 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 4,105 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 –</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Soil erosion reduction and prevention activities on the Boardman River in the Grand Traverse Bay watershed are not fully appreciated by the people who reside in and use the watershed. If the clear, sand-bottomed streams are to be preserved, a significant education effort must be undertaken in the watershed. This project will support other Great Lakes Basin Program projects in the watershed by constructing interpretive display panels and conducting teacher training workshops to educate Boardman River users about soil erosion control practices.

## BACKGROUND

This project builds upon successfully completed Great Lakes Basin Program projects designed to protect the Grand Traverse Bay watershed from excessive soil erosion and sedimentation. One component of the project will enhance the Grand Traverse Bay Initiative's Water Watch Program, an information/education program that teaches teachers and students about the value of soil erosion control. Another phase is intended to assess segments of smaller Boardman River tributaries for sediment loading. Support for this task will come from the Grand Traverse Conservation District, the U.S. Department of Agriculture's Natural Resources Conservation Service and graduates of the Water Watch Program. This component will identify priority sites for future monitoring and give Water Watch participants an opportunity to use their newly gained knowledge. Finally, project personnel will develop an exhibit on erosion control best management practices to display at the Initiative's Land and Water Resource Center.

## ACTIVITIES

Project personnel held a series of program development and workshop planning meetings, during which they recruited teachers to participate in the program. They also made arrangements to host a sediment monitoring workshop in collaboration with staff members from the Grass River Natural Area, who held a similar workshop in April 1999. In May 1999, project personnel conducted a riverbank restoration workshop, building upon the knowledge gained at the April workshop. Twenty-five students helped restore streambank integrity on the Boardman River in downtown Traverse City. At the same time, they learned about the impact of sedimentation on aquatic insects and fish spawning beds.

In order to educate the public about the Boardman River watershed and impacts from sedimentation, project staff constructed and installed two interpretative signs at sites along the Boardman River with high pedestrian traffic. A consultant developed a Geographic Information System base map of the Boardman River that was incorporated into the interpretive display. Project staff produced 8 laminated plots of the signs, distributing four to the middle and high schools participat-

ing in the Water Watch program and one each to the GTBWI center, the Grand Traverse Conservation District and the National Park Service Rivers and Trails program. Project staff retained one plot for use in public presentations to civic organizations.

## **RESULTS**

This project has reached a total of 585 students and 15 teachers through three workshops. Project staff estimate the interpretive displays will reach an additional 3,000 citizens and visitors beyond the grant period, informing them about the Boardman River watershed, the impact sedimentation has on river temperature and about the water quality monitoring being conducted on the river. The experience project staff gained in designing and constructing outdoor interpretative signs will serve to guide others who are developing interpretative educational signs for use in the basin.

# MINNESOTA

<b>PROJECT TITLE:</b>	<b>BAPTISM RIVER STREAMBANK STABILIZATION DEMONSTRATION</b>
<b>GRANTEE:</b>	<b>MINNESOTA DEPARTMENT OF NATURAL RESOURCES, TETTEGOUCHE STATE PARK</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 9,653 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 6,509 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 –</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Traditional erosion control projects that are structural, such as bulkheads, gabions and sandbags, are not aesthetically pleasing for natural areas such as parks. In such settings, an aesthetic approach could be achieved by using bioengineering techniques. Unfortunately, these types of projects have been few in number and poorly documented in Minnesota's Lake Superior watershed.

## BACKGROUND

The Baptism River is known to anglers as one of the better gamefish streams along Minnesota's North Shore. The stream supports steelhead and rainbow trout spawning in the spring and chinook salmon and brook trout in the fall. It has been characterized as "supporting, but threatened" for its ability to support aquatic organisms. Sedimentation degrades stream fisheries by abrading and suffocating organisms, reducing light penetration and photosynthesis, disrupting respiration and feeding efficiencies of invertebrates and fish and filling required hiding space for fry. Sediment also disrupts aquatic plants, warms water and transports nutrients attached to the soil, increasing undesirable plant and algae growth.

Bioengineering techniques to control soil erosion and sedimentation are aesthetically pleasing alternatives to structural solutions composed of concrete, sandbags and other "hard engineering" processes. There are relatively few examples of bioengineering for the north shore of Lake Superior available for those undertaking such projects. Therefore Tettegouche State Park personnel propose to develop a bioengineering project which will provide long-term protection of the Baptism River but also be aesthetically appealing. This demonstration project will also be used for the park interpretative program.

## ACTIVITIES

In the fall of 1998 project personnel identified and assessed potential sites, eventually choosing a 3/4 acre site with a slope ration of 2:1. In the spring, they consulted with Minnesota Board of Soil and Water Resources staff on an action plan. The group decided to use fascine bundles of willow as well as dormant stakes of willow, red osier dogwood and balsam poplar. A fast-growing native vegetation called blue joint grass and an erosion control mat were used for protection while the site was under construction.

The stakes and wattles were prepared by staff members and planted with the help of several volunteer groups. A group from the Wolf Ridge Environmental Learning Center and University of Minnesota – Duluth's Outdoor Recreation Program took part in the project to learn about the

process with the intention of applying it to some of their own problem sites. Both groups were experienced climbers and had the required climbing gear to work well on the steep slope.

The group used approximately 2,500 dormant stakes, 400 feet of wattles, 11 pounds of blue joint grass, two bushels of seed oats, and 40 rolls of erosion control mats. The project is helping to foster relations between the park and the local groups who are volunteering their time to help with the project.

During 1999 - 2000, project personnel monitored and evaluated the site and performed vegetation assessment, site protection and interpretive planning. Additionally, project personnel designed and printed a brochure that includes a synopsis of the project as well as photos and contacts for more information. The brochures will be disseminated at the Park office display as well as at a covered rack at the remediated site.

## **RESULTS**

The project remediated a 3/4 acre site. Project personnel estimate a 20 year life for the project, during which they expect up to 12,000 tons of soil, 129,000 pounds of phosphorus and 25,800 pounds of nitrogen to be kept on the land and out of the water. Additionally, the site will be visited by several hundred college students and teachers as well as landowners and personnel from local environmental learning centers and approximately 45,000 visitors annually. In the future, project personnel will develop an interpretive panel listing the history behind the site, the methods and materials used in erosion control, and a summary of the results. Project personnel also intend to include this material on CD for those interested in detailed descriptions of the project.

# MINNESOTA

<b>PROJECT TITLE:</b>	<b>KNIFE RIVER WATERSHED EDUCATION PROJECT</b>
<b>GRANTEE:</b>	<b>LAURENTIAN RESOURCE CONSERVATION AND DEVELOPMENT (RCD) COUNCIL, INC.</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 10,230 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 7,500 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Changing land uses in the Knife River Watershed in Minnesota have resulted in increased streambank erosion and sedimentation and a subsequent degradation of water quality and quantity. Many sites along the river lack riparian vegetation that if present, could reduce soil erosion.

## BACKGROUND

The Knife River Watershed encompasses an area of about 55,000 acres - approximately half of which is in private ownership and the other half in public, mostly county ownership. The Knife River system is unique among Lake Superior/North Shore tributaries because it is the only North Shore tributary that has no natural barriers preventing fish migration and utilization of the entire system some 70 plus miles of cold water fisheries habitat. It also supports the North Shore's only major naturalized wild steelhead population. Additionally, the Knife River is also in close proximity to a large metropolitan area and it is a major sediment source affecting Lake Superior.

According to the 1995 North Shore Steelhead Plan, land-use changes have resulted in the acceleration of streambank erosion and sedimentation, excessive fluctuations in streamflow and changes in water temperature. Cumulative hydrologic effects have combined over the years to impact negatively the Knife River system's water quality and quantity.

The goal of this project is to educate landowners and the public about how to minimize and prevent soil erosion and sedimentation and how to protect water quality, and wildlife and fish habitat in the Knife River and Lake Superior Watersheds. The Laurentian RC&D Council will create cost-share program for trees to be planted in high priority riparian areas and sponsor a hands-on bioengineering demonstration to educate landowners and the public on streambank stabilization to reduce soil erosion and control sediment.

## ACTIVITIES

The Laurentian RC&D Council produced four newsletters and mailed them to more than 650 persons/households in the Knife River Watershed and to other interested parties. The newsletters educated people about the importance of, and the need to reduce, soil erosion, sedimentation and nonpoint source pollution. The Council created a cost-share program to provide funds for small-acreage tree plantings and informed watershed landowners about the program through the newsletters. In addition, the Knife River Forester, a consultant, has started working with several landowners to create new Forest Stewardship plans.

Through the use of aerial photos and Geographic Information Systems (GIS), the Council identified, examined and prioritized sites for a bioengineering demonstration and eventually selected a site. The contractor for the site has decreased the steepness of the slope, stabilized the toe of the streambank and seeded and mulched the streambank. In the future, volunteers will cut and place willow branches into the streambank to further stabilize the streambank and prevent additional erosion. The Council plans to produce another newsletter to inform landowners about the bioengineering demonstration and techniques to stabilize their erosion problems.

## **RESULTS**

Through this project, the Council has been able to encourage five landowners to order a total of 650 trees through the cost-share program created by the Council, for planting on their properties. As a result of the Forest Stewardship Plans that the Knife River Forester is helping landowners develop, the Council anticipates landowners will place more tree orders in the future. The earliest tree-planting sites have already shown benefits in protecting and improving the water quality in the Knife River Watershed. This project has obtained the support of several landowners and local community groups who are interested in volunteering on the bioengineering project as well as learning the skills needed to conduct similar projects on their properties in the watershed.

# MINNESOTA

<b>PROJECT TITLE:</b>	<b>LAKE SUPERIOR SHORELINE PROTECTION PROJECT</b>
<b>GRANTEE:</b>	<b>LAKE SUPERIOR ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 20,000 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 20,000 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 –</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Minnesota's Lake Superior shoreline has approximately 60 miles of pockets of highly erodible red clay and silt. Red clay is made of very small particles which are easily eroded and suspended into the water. The clay degrades nearshore water quality and aquatic habitat when it settles on the substrate. Shoreline development has accelerated erosion in many areas as stabilizing vegetation is removed and often replaced by impervious surfaces, serving to concentrate runoff.

## BACKGROUND

The North Shore of Lake Superior is often perceived as being entirely rocky. There are, however, approximately 60 miles of Minnesota shoreline where the bedrock dips to or below lake level and red clay and silt deposits form banks up to 70 feet high. Over geologic time, cobbles and sand veins in the clay eroded into bolder-strewn and cobbled bays which provide excellent habitat for fish and other aquatic life.

Nonpoint source pollution is one of the major threats affecting water quality in Lake Superior. These threats are due to the erosion and sedimentation of the area's red clay soils. Tourism and development are increasing at a rapid rate along the north shore of Lake Superior in Minnesota and are imposing increasing pressures on the resource. Approximately 36 miles of Minnesota's Lake Superior shoreline have been identified as high erosion hazard areas.

Many of the eroding shoreline areas are landslide prone and must be stabilized in order to control erosion and maintain water quality. Engineering solutions to stabilize these problem areas are quite expensive and existing cost-share programs are not sufficient to meet current needs.

## ACTIVITIES

The project team developed a grant program by combining the Great Lakes Basin Program grant and a Clean Water Act, Section 319 grant. The two-cycle grant program complemented Minnesota's Clean Water Partnership (CWP) program. The first cycle of the grant was competitive in order to encourage each county to develop and implement their own CWP program. Each county established a technical advisory committee and reviewed proposed projects for soil erosion savings. The project team reviewed several potential project sites and selected two eroding clay banks for grant assistance. They have completed site surveys, design work and construction for both of these sites. The second grant cycle was a non-competitive allocation process available only to those counties with CWP programs already in place. The project team selected three sites and have completed or are in the process of completing site surveys, final design and construction documents for each of the sites.

## RESULTS

This project has provided a valuable addition of limited grant funds to the Minnesota Lake Superior Shoreline Protection Project program and the CWP loan program. The project's dollars have provided three Lake Superior counties with the needed incentives to develop and implement CWP programs. The project team selected a total of five high priority Lake Superior erosion control projects to be cost shared as part of their much larger Clean Water Partnership Program. They used the funds to support site surveys, design work, final plans and specifications and construction of the erosion control projects. Two of the counties have recently applied to the U.S. Environmental Protection Agency for additional funds to continue this program, ensuring that the benefits for the Lake Superior shoreline property owners and citizens of Minnesota will continue for years to come.

Project personnel estimate the life of the project at 20 years. Over that time, they expect 47,700 tons of soil, 239 pounds of phosphorus and 48 pounds of nitrogen will be kept out of Lake Superior improving both the lake quality and fish habitat.

# MINNESOTA

**PROJECT TITLE:** MILLER CREEK SEDIMENT TRAP MAINTENANCE  
DEMONSTRATION PROJECT

**GRANTEE:** SOUTH ST. LOUIS COUNTY SOIL AND WATER  
CONSERVATION DISTRICT

**BASIN PROGRAM FUNDS:** \$ 10,000 (APPROVED)

**NONFEDERAL FUNDS:** \$ 3,334 (PROPOSED)

**PROJECT DURATION:** JULY 1, 1999 -

**PROJECT TYPE:** DEMONSTRATION

**STATUS:** CANCELED AT REQUEST OF GRANTEE

## PROBLEM STATEMENT

Excessive loading of sediment and nutrients to Lake Superior and restrictions on dredging were identified by the St. Louis River Remedial Action Plant as causes to impaired use. Miller Creek delivers sediment to St. Louis Bay, which adversely affects aquatic habitat at the mouth to the stream.

## BACKGROUND

Miller Creek is a unique stream because it is an urban stream located in an area of heavy developmental pressure and yet it supports a reproducing brook trout population. The District has been planning an in-stream sediment trap for Miller Creek to catch the large amount of sand that enters the creek and negatively affects the trout population, and to reduce the amount of sediment that is delivered to St. Louis Bay, a Great Lakes Basin Area of Concern. The sand deposition is thought to be the result of winter road sanding operations around the highly urbanized Miller Hill Mall area. Project staff will also develop a maintenance plan to ensure the long-term effectiveness of the sediment trap.

## ACTIVITIES

This project was canceled at the request of the South St. Louis Soil and Water Conservation District.

# MINNESOTA

<b>PROJECT TITLE:</b>	<b>MULTI-AGENCY GIS DATABASE &amp; PLANNING TOOL FOR MINNESOTA'S LAKE SUPERIOR SHORELINE</b>
<b>GRANTEE:</b>	<b>MINNESOTA BOARD OF WATER AND SOIL RESOURCES</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 20,800</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 7,600</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 – JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

Nonpoint source pollution is one of the major factors affecting water quality in Lake Superior. Best management practices have been developed to address the problems specifically faced along Lake Superior's north shore. Despite active promotion, many miles of erodible shoreline are in need of stabilization to improve nearshore water quality. There is a need to coordinate and focus government programs in order to make the most effective use of limited funding and staff time.

## BACKGROUND

Erosion and runoff from failing septic systems are the primary sources of nonpoint source pollution along Minnesota's Lake Superior shore. Tourism and development are increasing rapidly in this area, significantly escalating activities that impact shoreline stability. Sedimentation is of particular concern along the north shore. Red clay and silt deposits here are highly erosive and substantially degrade the nearshore water quality and aquatic habitat when they enter the water. Red clay, in particular, is composed of very small particles and easily suspended in the water. As a result, visible plumes of suspended red clay spread offshore with even minor wave action. The clay particles settle to the bottom, blanketing the substrate and impacting fish habitat. Lakefront development has accelerated shoreline erosion in many areas by increasing and concentrating runoff and increasing the removal of stabilizing woody vegetation.

Many Minnesota government units have Lake Superior programs but there is limited funding and staff time to implement them and, until recently, efforts have also suffered from a lack of coordination and focus. The Lake Superior Association of Soil and Water Conservation Districts (the Association) and the Minnesota Board of Water and Soil Resources (BSWR) have identified upwards of 116 sites as requiring some form of erosion control project. With limited resources, only two to three projects can be started each year. To date, 26 projects have been completed or at least started, but over 90 sites are still in need of a best management practice. Most of these are in areas of high erosion potential.

The Association has partnered with the North Shore Management Board to develop a three year erosion control program funded through Minnesota's Clean Water Partnership Program. The program makes \$540,000 available for assistance supporting shoreline erosion control projects. In order to prioritize sites eligible for the funding, technical panels have been appointed for each of the three north shore counties. The technical panels have been charged with making the most effective use of available resources. Therefore the project team decided to develop a geographic information system (GIS) decision-making tool that will enable the technical panels to prioritize sites according to criteria such as geology and soil type, vegetative cover, proximity to prime fishery habitat and land use.

## **ACTIVITIES**

The various agencies with responsibility for land use and/or water quality along the north shore collaborated on the project. Participating agencies included BWSR, the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the Association, Lake, Cook and St. Louis counties and the North Shore Management Board. Representatives of these groups met to establish project goals, discuss application of the proposed GIS planning tool and identified existing data for the project. The group focused on how the tool could be made most useful in as many natural resource planning venues as possible.

The project team selected a GIS consultant who collected and reviewed the identified data sets and then used the data sets to prepare master CDs for each agency involved. The project team hosted a workshop to demonstrate the product and its application. The team described the extent of data sets and their coverage, demonstrated how to access the various data layers and determined what additional layers would need to be added to the enhance the product's usefulness.

## **RESULTS**

Given that the product has just been released, it is still too early to demonstrate its success. However, the South St. Louis Soil and Water Conservation District as well as the Minnesota Board of Water and Soil Resources lakeshore engineer have already used the tool to prioritize future work. Project personnel hope that the other two districts, as well as the Department of Natural Resources and the Minnesota Pollution Control Agency will adopt the tool for future projects.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>CRITICAL AREA SEEDING — ROAD BANKS</b>
<b>GRANTEE:</b>	<b>CAYUGA COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 15,000</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 — DECEMBER 31, 1999</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

According to a New York state Department of Environmental Conservation report, road banks in Cayuga County contribute an average of 60 tons of sediment per mile to the county's Lake Ontario sub-watershed. With over 3,000 miles of road banks in the county, this is potentially a significant source of sediment and nutrients to the watershed.

### BACKGROUND

In a 1975 report "Erosion and Sediment Inventory," the Department of Environmental Conservation's Division of Water found that road bank erosion can contribute a significant amount of sediment with attached nutrients and chemicals to the Lake Ontario watershed. In the water, sediment and associated chemicals degrade water quality, fish and wildlife habitat. Though the degree of erosion varies according to the state of the road bank, the type of soil, the amount of cover and the slope of the bank, the average loss in Cayuga County is 60 tons per mile. This means degraded water quality, the potential for flooding because of decreased stream capacity, as well as increased maintenance costs for the county highway department.

Many of the most highly erodible areas in Cayuga County have been identified. The remainder of the sites must be identified and appropriate best management practices (BMPs) implemented. For this type of erosion, critical area seeding is an inexpensive and successful BMP to use. Established seeding will stabilize highly erodible areas, preventing further erosion. Permanent vegetative cover can reduce surface runoff by 50 to 90 percent depending on vegetation type and density. Corresponding soil loss in surface runoff can be reduced by up to 95 percent and nitrogen loss by up to 90 percent.

### ACTIVITIES

The Cayuga County Conservation District developed partnerships with Town and County Highway departments to identify road banks most in need of seeding and develop an inventory for future projects. The partnership seeded a total of 15 acres of highly erodible road bank, choosing two locations as demonstration sites. At these areas, located in the town of Aurelius, signs have been installed to draw public attention to the project sites. The conservation district included several articles on the seeding project in its monthly newsletter, *Conservation Highlights*, which is distributed to the county legislature, other conservation districts and the general public. District staff also featured the project in its annual report. A picture of one of the demonstration sites can be seen on the district's web site [www.co.cayuga.ny.us/soilcon](http://www.co.cayuga.ny.us/soilcon).

## **RESULTS**

Soil erosion and sediment buildup has been effectively reduced with the implementation of vegetative seed on critical area roadbanks. Under this project, district staff and Town and County Highway Department personnel seeded 10 different roadsides, estimating an annual savings of 2,681 tons of soil, 26,810 pounds of phosphorus and 5,362 pounds of nitrogen. The road signs at the demonstration sites have raised awareness of passerbyers and residents. District staff have also developed an inventory of future sites that need to be seeded to prevent erosion.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>EROSION AND SEDIMENT CONTROL ORDINANCE PILOT PROJECT</b>
<b>GRANTEE:</b>	<b>WAYNE COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 4,763</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 1,670</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 - JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

Water quality monitoring has demonstrated that close to 4,000 tons of sediment annually enters Sodus Bay, contributing to degraded water quality and fish and wildlife habitat in Lake Ontario. In order to address this problem, the Wayne County Soil and Water Conservation District developed a local ordinance requiring erosion and sediment control measures for construction and new development in the county.

### BACKGROUND

The Wayne County Soil and Water Conservation District plays an integral role in assisting local governments with natural resource management issues. For instance, the district developed and facilitated the adoption of a common ordinance for septic systems in Wayne County. The district proposed a similar ordinance to address soil erosion and sedimentation control during construction. The application of such an ordinance will reduce the amount of sediment entering Sodus Bay annually and lead to improved water quality, and fish and wildlife habitat.

The goal of this project was to facilitate the adoption of an erosion and sediment control ordinance in fifteen Wayne County towns located in the Lake Ontario basin. This pilot project demonstrated the kind of interagency cooperation that integrates soil erosion and sedimentation control efforts with water quality initiatives and can be adopted throughout the region.

### ACTIVITIES

District staff drafted a model stormwater erosion and sediment control ordinance and sent it to the Director of the County Planning Department and two town supervisors for review and comment. The ordinance was also posted on the district's web site for review by the community at large and other communities contemplating similar measures. At the same time, district staff made municipalities aware of and encouraged them to use the technical support available at the district in order to reduce the burden of site review for municipal officials. Project personnel developed an educational brochure that can be used throughout the Great Lakes basin to promote the importance and benefits of the ordinance.

In July 1999, the district hired an outreach person to make presentations to the fifteen town planning boards to promote the adoption of an erosion and sediment control ordinance and to distribute supporting educational material and answer questions. District staff also developed press releases, which they placed in local newspapers around the county. The articles informed the public

about the District's campaign to promote stormwater management and erosion control. The district expects this multi-phase response will help protect freshwater resources.

## **RESULTS**

Through presentations at town meetings, dissemination of educational materials and press releases in county newspapers, District staff informed thousands of citizens and elected officials of the importance of adopting a stormwater erosion and sediment control ordinance. Towns have shown interest in the stormwater ordinance and many have contacted the district with further questions. This pilot project can be used throughout the Great Lakes Basin in order to greatly reduce the amount of nonpoint source pollution from sedimentation.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>MANAGEMENT INTENSIVE GRAZING IN THE GREAT LAKES BASIN</b>
<b>GRANTEE:</b>	<b>CAYUGA COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 5,000</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 - JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

According to the New York State Soil and Water Conservation Committee, more than 90 percent of New York's remaining water quality problems are due to nonpoint sources of water pollution. Management intensive grazing practices once implemented, will assist in the reduction of silts, sediments, pathogens and nutrients that are discharged into the Great Lakes Basin primarily as a result of nonpoint source pollution and soil erosion.

### BACKGROUND

The Seneca River and Lake Ontario have been identified by the New York State Department of Environmental Conservation as priority waterbodies. A high sediment load is recognized as the primary impairment of fish propagation in the Seneca River, by blanketing fish eggs and spawning areas with silt. Streambank erosion and primarily nonpoint source pollution from agriculture appear to be the major sources of sediment.

The practice of management intensive grazing (MIG) is an environmentally sound management practice that improves water quality and creates wildlife habitat where it is implemented. Unlike annual tillage crops that expose the soils, rotational grazing keeps the ground in permanent vegetative cover. This results in reduced soil erosion, decreased manure and urine runoff. Pasture establishment and maintenance through practices such as no-till and broadcast seedings, forage and soil tests and proper fertilization techniques greatly reduce soil erosion. Through rotational stocking methods, grazing livestock are moved frequently in order to protect against pasture overgrazing. As a result, there is an increased amount of grass available for wildlife use. These grassland areas are valuable to songbirds as nesting sites, feeding areas and as a refuge from predators. Cayuga County has been identified as a high priority region for habitat protection and development in New York State, partially because many wildlife species of concern are located in Cayuga County.

The practice of rotational grazing has been an area of increased interest and attention in Cayuga County, primarily due to funds the Cayuga County SWCD received from the NYS Department of Agriculture and Markets to offset expensive best management practices implementation costs for producers in specified watersheds. This project will enable more producers to implement management intensive grazing techniques on their farms.

## **ACTIVITIES**

In order to inform producers about the environmental benefits associated with rotational grazing and to explain the BMPs associated with management intensive grazing, District staff led pasture walks at participating farms and disseminated related literature at the Cayuga County Fair and various local farmer/consumer meetings. District personnel contacted producers interested in implementing MIG systems and made on-site visits to evaluate the sites and the environmental benefits that could be gained. They assisted six producers in developing and implementing rotational grazing systems.

## **RESULTS**

As a part of the rotational grazing systems, producers have fenced in a total of 13 acres of pasture, installed 5,780 feet of perimeter fence, renovated 64 acres, and created two buffer strips along the edges of pasture that borders a watercourse, keeping the animals out of the watercourse. The buffer strips will trap nutrients and sediments that may come off the field as well as create habitat for wildlife. Decreased feed costs and improved herd health resulted for both producers. Producers also installed two alternative watering systems that allow fresh water to be supplied to livestock in the pasture via pipeline, thus eliminating livestock use of streams and decreasing heavy use areas around watering troughs. Additionally, they stabilized 600 feet of animal walkways that were previously seriously eroded.

The implementation of BMPs on six farms has resulted in decreased erosion and runoff, increased wildlife habitat and improved water quality. District personnel estimate that over the 10 year life of the project 470 tons of soil, 1450 pounds of phosphorus and 290 pounds of nitrogen will be saved. District personnel reached 25 producers through pasture related meetings and tours and expect to reach 50 additional producers beyond the grant period.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>MONROE COUNTY HIGHWAY WATER QUALITY IMPROVEMENT PROJECT</b>
<b>GRANTEE:</b>	<b>MONROE COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 24,558</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 8,621</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 — DECEMBER 31, 1999</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

Roads and road construction contribute significant sediment and other pollutants to the Rochester Embayment of Lake Ontario, which is designated an Area of Concern under Annex 2 of the Great Lakes Water Quality Agreement. The Monroe County Department of Transportation requires technical support in order to design water quality protection features into county highway projects.

### BACKGROUND

The Rochester Embayment of Lake Ontario is one of 43 Great Lakes Areas of Concern designated under the Great Lakes Water Quality Agreement. Urban stormwater and/or construction site erosion are known sources of pollutants responsible for 8 of 12 use impairments in the Embayment, including sediment and pollutants from roads and road construction.

The Monroe County Department of Transportation (MCDOT) owns and operates over 650 miles of roads in the county. Approximately \$15 million is spent annually on repairing, rebuilding or maintaining these roads and associated bridges. Given the size of MCDOT's operations, a full-time water quality professional is required to review plans and inspect construction sites in order to identify and mitigate nonpoint source pollution associated with roadway construction.

In 1994, a group of staff from the MCDOT, Monroe County Department of Health, County municipalities and the Monroe County Conservation District addressed water quality concerns related to road construction. The group developed a "Highway Project Water Quality Improvement Strategy" which was designed to include water quality objectives in road construction projects. The strategy integrates water quality concerns early in the design phase of all highway projects that could have a potential impact on water quality.

MCDOT has already begun to implement water quality initiatives. These include improved construction-phase erosion and sediment control practices during county highway construction, incorporating stormwater management practices, such as the use of stormwater wetlands, into county highway projects and active participation on the county's Water Quality Coordinating Committee. This project will provide MCDOT with the additional technical support it requires to ensure water quality initiatives continue to be incorporated into road repairs and new projects. A water quality highway engineer was hired to work with MCDOT staff and was supervised by certified erosion control technicians from the Monroe County Soil and Water Conservation District.

## ACTIVITIES

The Monroe County Conservation District met with the county Director of Transportation to discuss the scope of the project and role of the Water Quality Highway Engineer (WQHE), whom they hired shortly thereafter. The WQHE reviewed the status of current highway projects in the county, toured recently constructed projects and met with MCDOT personnel to discuss maintenance issues related to water quality. The WQHE also attended three county Water Quality Committee meetings, numerous project specific meetings and a water quality seminar sponsored by local soil and water conservation districts. In the office, the WQHE reviewed proposed best management practices for practicality and implementation and reviewed standard details used on MCDOT projects, as part of their process of improving the Water Quality Management Strategy. The WQHE also began developing a basic Stormwater Pollution Prevention Plan, which will be utilized by MCDOT personnel and consultants on future projects.

## RESULTS

Project personnel reached 160 highway designers and consultants in field and office meetings as well as hosting a two-day workshop specifically tailored for highway projects and personnel. They discovered that highway personnel are not well versed in the need for compliance with the National Pollutant Discharge Elimination System (NPDES) permit. Through reviewing plans of projects and visiting field sites, project personnel also found that contractors were not inspecting and maintaining erosion control features on a regular basis and did not consider the impact of whole watersheds into their designs.

Project personnel made recommendations regarding the necessary integration of soil erosion control and stormwater quality enhancement practices into the MCDOT design and construction process. The primary construction issue appears to be the need for controlling erosion and developing an understanding about the importance of timing, sequence and scheduling as it effects construction erosion control. Best management practices need to be expanded or modified because the traditional practices, straw bales and silt fences, are the only ones being employed when more effective practices are available. These include channel protection down stream of culvert pipes and rock check dams for velocity control. Additionally, project personnel recommend that all projects disturbing 5 acres or more of land be required to file a General SPDES Permit for Construction Activities and have a complete Stormwater Pollution Prevention Plan.

Project personnel estimate that their efforts have affected 60 acres of land. During the one year life of the project, project staff estimate that 6,000 tons of soil with an associated 600 tons of phosphorus and 1,200 tons of nitrogen will be prevented from entering waterways.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>OSWEGO RIVER EROSION CONTROL PROJECT</b>
<b>GRANTEE:</b>	<b>OSWEGO COUNTY PLANNING AND COMMUNITY DEVELOPMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 13,058 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 6,529 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>MAY 1, 1997 —</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### PROBLEM STATEMENT

Residential development along the Oswego River, in New York state's Lake Ontario watershed, has removed both native ground cover vegetation and trees. This causes accelerated soil loss and streambank erosion while increasing the amount of sediment and pollutants, such as fertilizers and pesticides, that enter the river also impacting Oswego Harbor and Lake Ontario. Boats with excessive wakes further exacerbate streambank erosion. As a result, fish and wildlife habitats are disrupted and the canal's aesthetic appeal is reduced.

### BACKGROUND

Numerous studies have identified sediment problems along the Oswego River and in the Harbor. For example, the Oswego County Water Quality Strategy concluded that the Oswego River upstream from the Harbor to the junction at Three Rivers is impaired due to silt and sedimentation. The Oswego River has been placed on New York's Priority Water Problem List and identified for preservation of scenic qualities under the State Canal System Revitalization Plan. Additionally, Oswego Harbor has been designated an Area of Concern under the Great Lakes Water Quality Agreement, and the resulting Remedial Action Plan (RAP) is designed to reduce sediment and nonpoint source pollution inputs into the Oswego Harbor.

The Oswego County Planning and Community Development office proposed a three-part program to identify erosion problems on the river, prioritize the eroding areas with recommended actions and develop an outreach program directed at local governments and property owners.

### ACTIVITIES

A visual survey and video tape record of the Oswego River shoreline provided the raw data that enabled erosion problems to be identified. Geographical Information System (GIS) maps were then created to identify shorelines, streambanks and other areas requiring protective and/or remedial action.

The team assessed development pressures on riparian property based upon municipal development plans. They produced a report titled *The Determination of Buffer Widths: Literature Survey and Recommendations for Oswego County, New York*. The team used the report to prepare a model ordinance that would encourage the creation of a riparian buffer zone between development and the river bank. They disseminated the ordinance to municipal governments and planning boards throughout the county.

The team then developed an educational outreach program that addressed current land use and erosion conditions, remedial measures and environmental impact and also outlined the economic benefits of proper streambank management.

## **RESULTS**

At a public meeting held in June 1998, over 120 people heard presentations from the Oswego County Environmental Management Council, the Department of Planning and Community Development and the Oswego County Soil and Water Conservation District. Attendees also received a number of pamphlets designed by the project team, Cornell University Cooperative Extension and the U.S. Department of Agriculture - Natural Resources Conservation Service. Conservation district staff offered assistance to riparian landowners requesting a site visit and erosion evaluation. Many site visits have resulted from this event.

Following the public meeting, Oswego County planning personnel presented information at municipal planning board meetings for nine local municipalities, as well as for sessions of the Environmental Management Council. These events reached some 110 local legislators. The model ordinance was announced through the press and communicated directly to the New York State Canal Corporation and the Oswego County Sheriff. News releases and newsletters potentially reached an audience of over 120,000. Educational opportunities were arranged for over 6,000 boaters, shoreline owners and members of the general public.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>PENFIELD WATERSHED MANAGEMENT EDUCATION BROCHURE</b>
<b>GRANTEE:</b>	<b>TOWN OF PENFIELD</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 3,375 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 1,125 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### PROBLEM STATEMENT

Nonpoint source pollution has been identified as a major source of degraded water quality in the Irondequoit Bay on Lake Ontario, a major environmental and recreational resource for the Penfield community. According to Monroe County water quality experts, the rate of erosion from the Irondequoit Bay Watershed into the environmentally sensitive bay has more than doubled over the last 40 years.

### BACKGROUND

As a result of the increased degradation of water quality, the bountiful fish and wildlife of the bay and its feeding creeks and streams are at risk. Additionally, water based recreation on the increasingly murky waters of the bay are threatened. Irondequoit Bay is listed on the state's Section 303 (d) list under the Clean Water Act and it is a designated Area of Concern. The Remedial Action Plan for the Lake Ontario Basin and several water quality agencies and nongovernmental organizations have identified the town of Penfield as Irondequoit Bay's most significant source of sediment pollution.

The local government, working in cooperation with county, state and federal agencies, has taken steps to address this issue. In the summer of 1998, the Town of Penfield completed a \$200,000, five-year-long erosion control project on the Irondequoit Creek, which is expected to reduce the amount of bay sediment by almost 50 percent. There is already need for another large erosion control project to further clean up the water that is flowing into the bay. However, it is difficult to convince a community with limited resources to fund these type of projects and support stricter development guidelines without driving home the direct impact they have on community life, the environment and the economy.

### ACTIVITIES

Penfield's Watershed Management Committee, working with the Town Engineer, gathered all relevant information about sediment pollution and erosion control in Penfield and the impact this growing problem has on the environment, the economy and the lives of Penfield residents. They detailed the activities that have taken place in the community to address these issues as well as the actions local governments and residents can take to ensure the future water quality and erosion control of the Irondequoit Bay Watershed.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>PROTECTED SHORES: ENHANCING YOUR SHORELINE PROPERTY THROUGH PROPER MANAGEMENT PRACTICES</b>
<b>GRANTEE:</b>	<b>ONTARIO COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 9,000</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 3,000</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 - JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

The watersheds of the western Finger Lakes are undergoing rapid growth, especially along the shoreline. Consequently problems such as overcrowding, lack of public access to the lakes, lack of proper sewage treatment, loss of vegetation, destruction of shallow riparian areas and increased erosion from bared shores and streambanks are being exacerbated.

The western Finger Lake watersheds are experiencing rapid redevelopment and growth along the shoreline. The property facing development pressure now often has significant problems because much of the best property has already been developed. Lots are often too small, slopes are too steep, they lack sufficient soil cover for the required infrastructure or are too low, relative to lake level, for proper development. In these cases, development problems such as crowding, poor or inadequate sewage treatment, vegetation loss, destruction of shallow riparian areas and soil erosion are exacerbated.

### BACKGROUND

There is not a sufficient recognition of the role sedimentation plays in water pollution among the public in the Finger Lakes region, nor does the public realize the relationship between sedimentation and the addition of nutrients and toxic chemicals to the water. While some pollution issues, such as sewage treatment, can be addressed through infrastructure programs, others, such as loss of shoreline vegetation and increased erosion, require a different approach. These nonpoint pollution problems can appear insignificant if considered in isolation and their cumulative impact is not well understood. Often riparian owners resist what they perceive to be "intrusive regulations" because they wish to use their properties as they see fit.

Erosion and sedimentation are important to a wide range of Finger Lakes users and yet a good understanding of it is not widespread in the region. Watershed protection groups have actively developed watershed awareness on individual lakes for almost 25 years but they have not had much success in extending individual watershed knowledge to the Great Lakes basin. The Ontario County Soil and Water Conservation District proposed an information and education program designed to increase awareness of all these connections and build important bridges between shoreline and upland interests.

### ACTIVITIES

Project personnel, including an intern from William Smith College, identified existing publications that addressed the issues faced in the watershed. Where existing publications were not adequate, the

project team developed new ones. The team developed a Protected Shores workshop and presented it on five occasions during the project period. The program consisted of a presentation on natural beaches and shores, including their formation, structure and function, as well as soft and hard engineering methods that can be used to protect them. Workshop leaders provided attendees with technical advice on choosing the appropriate approach to shoreline protection and enhancement according to the scale and severity of the problems at individual sites. The literature developed for the watershed was also available to the attendees. In addition to the Protected Shores workshops, the project team made the watershed literature available during cottage and homeowner association meetings and other relevant groups.

## **RESULTS**

Information on Protected Shores reached over 5,000 shoreline owners, students, contractors and elected officials. Information included workshop announcements as well as additional educational material. Project personnel presented the Protected Shores workshop to a total of 225 people during five events. The team also conducted a macroinvertebrate workshop with 120 school children to teach them about the relationship between shoreline development and the condition of shallow riparian areas. Project personnel estimate information on shoreline issues and solutions to these problems will reach an additional 500 to 1,000 shoreline owners and elected officials beyond the grant period.

As a result of the educational activities of this project, the Finger Lakes Watershed groups are more aware of the integrated nature of Finger Lakes within the larger Great Lakes system and have begun including shoreline issues into overall lakewide management plans. Additionally, this project has led to increased communication and cooperation among individual Finger Lakes watershed associations and related agencies, associations and municipal officials. Through the mailings, presentations and workshops, project staff have increased the awareness of thousands of shoreline property owners and contractors as to the effects that their actions have on the Finger Lakes and what they can do to help improve the water quality of the Finger Lakes.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>REMEDIAL EROSION AND SEDIMENT CONTROL FOR SALMON CREEK</b>
<b>GRANTEE:</b>	<b>TOMPKINS COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 9,250</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 98,000</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>CANCELED AT REQUEST OF GRANTEE</b>

### PROBLEM STATEMENT

Salmon Creek in Tompkins County is essentially a wide-bodied canyon, there is little flood plain to accept high runoff and reduce flow velocity in the stream. Due to this, runoff events in this watershed are flashy and involve severe stream bank erosion and sediment transport. A preponderance of this erosion occurs in the many meanders and sharp bends of this stream. District staff are examining the stream channel's history during the last two decades to determine the changes that have occurred through stream bank erosion.

### BACKGROUND

The purpose of this project is to remediate erosion and sediment problems in Salmon Creek. District staff are basing their work on the premise that maintaining the stream channel in the natural course most efficient for water transport will reduce or eliminate much of the erosion and sediment loading that occurs in the stream. District staff will reestablish the stream channel in its most efficient natural course as indicated by comparison of changes in the stream channel as they relate to severity of sediment loading and flood damage in the watershed.

District staff will survey the agricultural practices within the watershed to identify and locate problems related to surface runoff, erosion and sediment loading of the stream and identify, survey, design and implement erosion control measures in the stream. They will install bendway weirs and willow plantings to address the severe erosion occurring on the streambanks in the bendways and oxbows of this stream. Stabilizing the meanders will also result in improved fish habitat.

### ACTIVITIES

The grant has been canceled at the request of the grantee due to a lack of information required to complete the stream restoration.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>ST. LAWRENCE RIVER SHORELINE: BIO-TECHNOLOGY SHORE STABILIZATION</b>
<b>GRANTEE:</b>	<b>ST. REGIS MOHAWK TRIBE</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 21,950 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 7,316 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### PROBLEM STATEMENT

Many sites along the shoreline of the St. Lawrence River are experiencing erosion. Traditional methods, such as the use of rock rip rap can be very expensive and has limited progress on the part of the Native American residents and governments in controlling erosion in the past. This project will seek to demonstrate a more economic alternative to standard rock rip rap.

### BACKGROUND

The St. Regis Mohawk Reservation is located in both the United States and Canada, with the St. Lawrence River flowing through the middle. Many areas of erosion exist along the St. Lawrence shoreline. Privately owned areas, as well as Tribal lands, have lost large sections of shoreline because of the altered current flow of the St. Lawrence River and its tributaries and the impact of wakes in this commercial shipping zone.

This project will stabilize 1000 feet of shoreline adjacent to the Tribe's water treatment plant. A Local Working Group comprised of concerned individuals from the Natural Resource Conservation Service, the Tribe Council and the Tribe's Environment Division chose this site because of its high profile, which will enable it to serve as an effective demonstration of shoreline stabilization. A more economic alternative to standard rock rip-rap will utilize vegetation in conjunction with rock rip-rap to stabilize shorelines, reducing contaminated sediments and eroding soil from entering the St. Lawrence River.

### ACTIVITIES

Before work could begin on the site, the Tribe was required to submit a Tribal Environmental Review. They researched, evaluated and integrated concerns regarding archaeological sites and bird species habitat into the environmental review. An ornithologist, who assisted in researching bird species habitat, determined that no threatened or endangered bird species would be negatively affected by the project. After a 30-day notice period, no comments were generated and the Tribe's Environmental Quality Officer issued a Finding of No Significant Impact. Also, the Tribe submitted a necessary Tribal Wetlands permit application through the Tribes Wetlands Protection Act, which was approved on the condition that runoff and turbidity would be controlled through the placement of a silk curtain.

The Tribe coordinated efforts with the landowner where the site was located to ensure that the project design, goals and construction activities were understood by the owner prior to construction. Landowner cooperation and understanding was important to the success of the project. The

Tribe provided the landowner with copies of the project description; the landowner then participated in meetings held between the Tribe and NRCS staff to ask questions and provide input and comments. The Tribe and NRCS maintained an open door policy throughout the project for the benefit of the landowner.

The Tribe held planning meetings with construction staff to coordinate materials, equipment staff and other resources used in the project. Project personnel evaluated two technologies to be employed in controlling turbidity and sediment in the work area and chose to use the lower cost and more effective silt curtain. NRCS engineers developed and submitted a design for rock rip-rap installation and obtained cost estimates for purchasing and transporting the rock rip-rap. NRCS staff will design the vegetative stabilization of the slope and the riparian buffer strip.

NRCS staff provided options to Tribal staff in the selection of bio-technology materials for bank stabilization, including sources. The NRCS indicated "StreamCo" willow as being the preferred willow for use in wattles to be placed along the bank in trenches. Project personnel evaluated cost and storage considerations for local collection of willow versus purchase of prepared wattles from a nursery. While local collection had low materials cost, labor and storage considerations limited this alternative as a viable option. Project personnel decided that it would be more feasible to purchase wattles from a supplier, so they searched for suppliers of wattles and other bio-technology materials in the New York State, New England and New Jersey areas. After finding very few suppliers in these areas, project personnel located a supplier in Canada for consideration.

## NEW YORK

<b>PROJECT TITLE:</b>	<b>WHAT'S THE DIRT</b>
<b>GRANTEE:</b>	<b>AQUARIUM OF NIAGARA</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 15,000</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 21,367</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 — JANUARY 31, 2000</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

Soil erosion and sedimentation is an increasing problem in the Great Lakes basin as urban and suburban development encroaches on previously natural areas such as wetlands and forests. Local governments and citizens must understand the impact of development on their water quality if they are to protect it adequately. Local elected officials do not usually have the necessary knowledge to understand and appreciate these issues, nor do the citizens who elect them. Therefore pressure to control soil erosion is not brought to bear on elected leaders.

### BACKGROUND

The Aquarium of Niagara is a public center of learning and recreation, open 363 days a year. The Aquarium receives a significant proportion of the 5.5 million tourists who visit Niagara Falls annually, providing a wonderful opportunity to educate people about environmental issues in the Great Lakes basin. The Aquarium created an exhibit explaining and demonstrating erosion and sedimentation and their impact on Great Lakes water quality. The exhibit addresses a number of issues such as: the causes of erosion, its affects on individuals and the ecosystem; the impact of polluted sediment; the difference between natural and human-induced erosion, methods of controlling erosion; and how individuals can effect change. The exhibit is supplemented by a take-away brochure.

### ACTIVITIES

The Aquarium developed a collaborative advisory committee of staff, consultants and volunteer representatives of six partner agencies. The group met regularly and collected information pertinent to the project. Members of the group also visited a nearby demonstration farm and research vessel to collect additional information on soil erosion and sedimentation issues.

The committee reviewed the collected information and decided what should be included in exhibit modules and the brochure. After completing the design of the exhibit, the committee also selected a location for the exhibit in the Aquarium's primary exhibit gallery. Brochures are available at the exhibit, which include a significant amount of easily understandable information about soil erosion and sedimentation. They have proven to be very popular, necessitating daily restocking.

Aquarium personnel have and will continue conducting an exit survey to measure the exhibit's effectiveness. Guests are given an incentive to complete the survey - a discount at the Aquarium gift shop.

## **RESULTS**

This project has created a new learning opportunity and experience on topics that have never before been presented in the Aquarium's exhibitry and public programming. The audience this project reaches is significant and diverse. The average annual visitation is 170,000, and includes local school children and families, as well as travelers to Niagara Falls from around the globe. With its colorful images, simple graphics and living components, the exhibit appeals to guests of all ages and backgrounds. Through the exhibit, visitors will learn about the importance of soil erosion and sediment control.

The exhibit is part of the Aquarium's regular exhibits tour, and therefore will continue to impact similar numbers of people in future years. As increasing numbers of people become aware of problems of soil erosion and sedimentation in the Great Lakes, learn more about them, and use this knowledge to make informed and responsible decisions, and encourage elected officials to do the same, the combined effects will have a positive impact on soil erosion and sedimentation.

# OHIO

<b>PROJECT TITLE:</b>	<b>BLACK RIVER BIOENGINEERING INITIATIVE FOR THE RIPARIAN LANDOWNER</b>
<b>GRANTEE:</b>	<b>LORAIN COUNTY SOIL AND WATER CONSERVATION DISTRICT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 14,929</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 16,300</b>
<b>PROJECT DURATION:</b>	<b>JUNE 1, 1998 – DECEMBER 31, 1999</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## PROBLEM STATEMENT

Intensive land-use, associated with agricultural activities and unplanned development, produces excessive sedimentation in the Black River watershed, resulting in an increased possibility of flooding and degraded aquatic communities. This is an issue of particular concern for the watershed because it contributes to the area's designation as an Area of Concern under the U.S.-Canada Great Lakes Water Quality Agreement.

## BACKGROUND

The goal of this project is to develop a private-public partnership to educate landowners to restore and protect riparian corridors in the Black River watershed. The project will encourage inexpensive, independent and effective work on private land in the watershed to mitigate the impact of intensive land-use. Several studies have indicated that agricultural practices in particular are generating significant sediment loads to the Black River.

Despite these significant sediment loads, Lorain County continues to approve activities that alter the landscape and the flow along riparian corridors in the Black River watershed. These activities include flood control as well as agricultural and residential development. Riparian corridor manipulation will continue to occur under the heavy development pressures experienced by Lorain County. For example, Lorain County loses 1,000 acres of farmland annually, while at the same time approving approximately 300 new residential septic system permits. The county has approved some 3,240 acres of residential, commercial and industrial development within its boundaries including a multi-million dollar investment project to widen Interstate 90. These intensive land-use impacts will continue to stress streams in the Black River watershed unless riparian best management practices are implemented.

## ACTIVITIES

An expert in ecological assessments, planning and restoration from Biohabitats, Inc., assessed stream channel conditions and recommended restoration and/or stabilization measures on six sites in Lorain County. Lorain County Conservation District personnel initiated six riparian best management practices. Five restoration sites feature evergreen revetments while the sixth is a seeding demonstration. Evergreen revetments provide a place for fish and insects to hide from predators, spawn or lay eggs and also serve as a food source. They serve to break up the stream's energy and settle out suspended solids or sediment that is being transported by the water. Seeding is a low-cost and effective sediment control method that also provides habitat.

The first evergreen revetment site is located on a local golf course. Here project personnel used 43 Christmas trees, ranging from 15 to 30-feet in length, to provide toe protection and streambank stabilization to an area where fast-flowing water undermined bank stability. Volunteers from the environmental technologies class at a local vocational school helped with the project. They completed the project by planting quick rooting vegetation above the revetment.

Another evergreen revetment is stabilizing an eroding streambank on private land. With the help of student volunteers from the environmental technologies class and conservation district staff, the landowner drilled, placed and anchored Christmas trees in place along the toe of the streambank. The area above the site was planted with willow and red-osier dogwood cuttings for further stabilization.

A third evergreen revetment in a Lorain County metro park was installed by conservation district personnel and 25 Coastweeks volunteers who participated in this hands-on National Coastweeks event. Project participants placed evergreens in and along an eroding streambank then strategically placed three “kickers” to re-direct stream flow back to the center of the channel. Fast rooting vegetation was integrated into the revetment.

At the same metro park site, project personnel were able to demonstrate ten varieties of shade tolerant grasses. They prepared ten individual plots which were also overseeded with annual rye for quick ground cover, seeded the sites and covered them with erosion control netting. In addition, three of the ten plots were afforded additional stream toe protection with rocks and logs.

## **RESULTS**

Project personnel have provided streambank stabilization demonstration practices to private and public landowners in Lorain County and have invited local public agencies and schools to participate in completing the streambank restoration project. Furthermore, they have provided information and instruction to landowners on restoring and enhancing streamside vegetation, bank stability and stream equilibrium.

Over the anticipated 20 year life of this project, project personnel estimate that 129 tons of soil, 1,288 pounds of phosphorus, and 258 pounds of nitrogen will be saved as a result of this project. Through tours, workshops and field days, project personnel reached over 1,000 people, including elected officials, planning commission members, students, engineers, soil and water conservation district personnel, landowners and farmers.

## OHIO

<b>PROJECT TITLE:</b>	<b>CHAGRIN RIVER SEDIMENT AND EROSION MANAGEMENT GUIDE</b>
<b>GRANTEE:</b>	<b>CHAGRIN RIVER WATERSHED PARTNERS, INC.</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 10,485</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 4,407</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 - AUGUST 31, 2000</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

### PROBLEM STATEMENT

Land-use changes and practices in the Chagrin River watershed are altering the hydrologic regime, the water and the natural resource base. The principal causes are increased impervious surfaces, removal or alteration of natural vegetation and changes in land-use activities. These trends are expected to continue with ongoing out-migration from the Cleveland metropolitan area.

### BACKGROUND

Land-use changes in the Chagrin River watershed are disrupting the hydrologic cycle and ecosystem functions provided by the water and natural resource base. These changes have resulted in more frequent bank-full events at both the sub-watershed level and in the main stem of the river. More bank-full events leads to greater streambank erosion and sedimentation, increasing the sediment load to Lake Erie. Trees and woody debris from the undermined banks are carried downstream where they jam, forcing more frequent channel clearing. Altered low flow conditions and sedimentation degrade critically important walleye, steelhead and other species' spawning habitat. Recreational opportunities are reduced due to the siltation and dredging costs to maintain recreational boating facilities are increased as well. These impacts lead to short and long term ecological and economic costs that have to be born by local governments and citizens in the watershed.

In 1996, in response to the erosion and sedimentation problems in the watershed, the local governments came together to form a nonprofit organization, the Chagrin River Watershed Partners (CRWP). The CRWP's goal is to preserve and enhance the river and its watershed as a high quality natural resource while also minimizing future costs for maintaining watershed infrastructure. The Partners are funded by the local governments which are members of the partnership, the Gund Foundation, the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency.

CRWP staff are developing a variety of tools for member communities to address erosion and sedimentation including model ordinances addressing riparian buffers, stormwater runoff, site development, steep slopes, erosion and flood plain management. The Partners have noted some institutional barriers to implementing the tools that are under development. CRWP personnel proposed an erosion control guide to raise awareness about the causes and costs of erosion and sedimentation among both decision makers and watershed residents. Project personnel also intended the guide to build the stakeholder support required to overcome barriers preventing the implementation of cost-effective best management practices.

## ACTIVITIES

The project team struck a five member Technical Advisory Group (TAG) composed of representatives from soil and water conservation districts, the Ohio Department of Natural Resources, the U.S. Department of Agriculture's Natural Resources Conservation Service and a CRWP community member . TAG members advised on the content of the watershed guide, examined existing materials to avoid duplication and reviewed the final product for accuracy and completeness. The guide was also reviewed by other Ohio Department of Natural Resources personnel as well as CRWP's Executive Committee.

The final product, *The Chagrin River Watershed User Manual*, has easy-to-read text and illustrative photographs and diagrams that help the reader explore four questions: what should I know about the Chagrin River watershed; what problems accompany land-use change; what are some solutions; and how can I get more information?

## RESULTS

CRWP personnel distributed *The Chagrin River Watershed User Manual* to a total of 2,800 people including the CRWP Board of Trustees, mayors, councils and presidents of township trustees in all communities in the watershed, municipal engineers, planning directors, floodplain administrators, law directors and building and zoning inspectors in those communities. The guide also went out to planning and zoning commissions, planning and engineering firms serving CRWP members, state and federal legislators in the watershed and all other local, state and federal agencies working in the watershed. Finally, organizations with an interest in the watershed, including the Ohio Homebuilders Association, EcoCity Cleveland, the Holden Arboretum, the Cleveland Audubon Society, the Chagrin River Land Conservancy, and many others, also received the watershed guide. Additional copies will be distributed at CRWP presentations and workshops and sent out to any agency, especially soil and water conservation districts, upon request. Project personnel expect to reach an additional 2,200 people beyond the grant period through distribution of the watershed guide.

## OHIO

<b>PROJECT TITLE:</b>	<b>SUDDEN SOIL DENSITY CHANGE TRAINING SESSION</b>
<b>GRANTEE:</b>	<b>CONSERVATION ACTION PROJECT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 4,600 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 19,090 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

### PROBLEM STATEMENT

Farmers in the Ohio Lake Erie basin estimate that their annual corn yields are reduced by almost 10 percent, their soybeans by 7 percent and wheat by 5 percent due to soil compaction associated with conservation tillage practices. This translates to an average loss of \$18,000 per farm annually. These kinds of losses proved discouraging to farmers who began to return to traditional farming practices in order to increase their yields.

### BACKGROUND

Soil compaction is caused by heavy farm equipment moving repeatedly over crop fields. With conservation tillage, the first four inches of the field is relatively lightly compacted in structure because it is broken up during tilling. The next layer deep, at approximately seven inches, is more dense with soil particles much more tightly packed. Plant root systems grow to relatively wide diameters in the first layer of the soil and, because of this, are unable to penetrate the deeper and more compact layers below. This means plants cannot benefit from moisture and nutrients deeper in the soil and yields are subsequently reduced.

Working in partnership with the Wood County Con-till Club, local soil and water conservation districts, The Ohio State University Extension and Ohio Agricultural Research and Development Center, Conservation Action Plan of Ohio (CAP) received a Great Lakes Basin Program grant to address the problem of soil compaction associated with conservation tillage. CAP retained Ken Ferrie, a consultant who works with farmers on a range of soil fertility and crop issues, to help teach better conservation tillage practices to the farm population in the northwest Ohio counties of Defiance, Fulton, Henry, Lucas, Paulding, Williams and Woods.

### ACTIVITIES

CAP and partners hosted three workshops that reached 188 farmers in the seven, northwest Ohio counties. Ken Ferrie outlined the problems associated with compacted layers in the soil, how to identify the condition, what causes the problem and what can be done to avoid it. Ferrie noted that discs, coulters and plows were the tilling implements causing the most severe horizontal compaction. Chisel plowing, Ferrie noted, was the best system for managing horizontal laying, but blending the soil and taking out the deepest layer may take a number of years to accomplish. The best approach is to undertake light fall tilling because freezing allows the soil to expand and contract over the winter, reducing the effect of horizontal layers.

### RESULTS

CAP undertook an exit survey of farmers attending the sessions. Eighty-three percent of farmers attending indicated that they believed soil compaction was limiting crop yields on their farms by as

much as 5 to 9 percent. When asked to compare their farming practices in 1999 to what they had done in 1993, they reported farming over 790 acres in 1999 compared to 674 acres in 1993. In 1999 almost 65 percent of their crop was planted as no-till, while in 1993 only 55 percent had been no-till. Interestingly, the amount of acres in soybean and wheat tillage had increased by 22 percent and 9 percent respectively, while corn grown under no-till had declined by 4 percent. These sessions will enable attending farmers to overcome the compaction problems associated with reduced yields and, hopefully, reverse the downward trend in no-till corn acreage in the Ohio Lake Erie basin.

# PENNSYLVANIA

<b>PROJECT TITLE:</b>	<b>CASCADE CREEK SEDIMENTATION CONTROL AND EDUCATION PROJECT</b>
<b>GRANTEE:</b>	<b>LAKE ERIE ARBORETUM AT FRONTIER PARK</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 24,775 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 15,325 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Cascade Creek is an urban stream experiencing streambank erosion and sedimentation in many places where vegetation is minimal. A portion of the stream running through an arboretum provides a unique opportunity for visitors to learn about the relationship between vegetation and water quality.

## BACKGROUND

Lake Erie Arboretum at Frontier Park is an outdoor classroom for visitors. Running through Frontier Park is Cascade Creek, an urban stream that is strongly influenced by stormwater flows. Although urban sediments contaminate the stream, the water quality is good enough to support annual stocking of trout and runs of steelhead trout for breeding. However, the stream is in need of additional trees for shading to enhance the stream ecology and increase the root mat, providing streambank stability and nutrients filtering. This project seeks to improve the water quality of Cascade Creek as it runs through Frontier Park and to provide an educational opportunity for park visitors to learn about the relationship between vegetation and water quality. The quality of water and sediments in Cascade Creek have special significance as they directly affect the water quality of Presque Isle Bay, a designated Area of Concern.

Additionally, this project will provide education regarding the importance of trees in riparian buffer zones by creating informational stations that demonstrate the relationship between plant material and water quality for visitors. The selection and availability of the types of trees that will grow streamside and in floodplains will be helpful as a demonstration project and each type of tree will be labeled.

## ACTIVITIES

Lake Erie Arboretum at Frontier Park (LEAF) solicited volunteers from various landscape companies to plant 183 trees along Cascade Creek. LEAF staff designed, constructed and installed information stations along the creek that describe the riparian buffer and the positive effects it has on the water system as well as identification labels for the newly planted trees. LEAF also designed and purchased a nature center display. To facilitate dissemination of project information, LEAF updated their website to include photos, illustrations and text describing the riparian buffer system.

## RESULTS

LEAF has provided three different sources by which the community can gain knowledge about the importance of minimizing the effect of sediments on the Great Lakes through the creation of a

riparian buffer zone - a nature center display, a web site and informational stations located throughout the park. LEAF conducted an Arbor Day Celebration and a LEAF festival in which 400 students and visitors learned about the importance of trees to the environment and/or enjoyed the newly placed amenities in the park.

As a result of this project, thousands of community members who visit the park, read the signs and/or visit the Nature Center will be made aware of the importance of trees in controlling soil erosion and sedimentation. The riparian buffer will help improve water quality in the creek and provide improved habitat for birds, fish and other aquatic life.

# PENNSYLVANIA

<b>PROJECT TITLE:</b>	<b>DETERMINATION OF SEDIMENT LOADING POTENTIAL TO PENNSYLVANIA LAKE ERIE COASTAL WATERS DUE TO BLUFF EROSION AND STORMWATER DISCHARGE RAVINES</b>
<b>GRANTEE:</b>	<b>EDINBORO UNIVERSITY OF PENNSYLVANIA</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 24,000 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 10,450 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>PROGRAM AND TECHNICAL ASSISTANCE</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

Bluff erosion is a measurable phenomenon taking place along the forty-seven miles of Pennsylvania's Lake Erie shoreline. While there is an increasing awareness of the cause and effect elements associated with bluff erosion, there remains an inadequate understanding of the character of the sediments eroded and discharged into the waters of Lake Erie.

## BACKGROUND

The rate of erosion taking place along Pennsylvania's Lake Erie shoreline, resulting in recession losses in the upland, varies with stratigraphy, ground water discharge, land use and topography. A certain amount of bluff erosion is related to naturally occurring physical forces. However, bluff erosion is also related to unwise land-use decisions in the upland, including the discharge of stormwater into drainage ravines which erodes the channel and exacerbates sedimentation problems at the lakeshore interface. Bluff erosion is accelerated by landowners who do not control surface and subsurface discharge in the direction of the bluff. Also, removal of vegetation for scenic viewing or the construction of trails and roads across the bluff destabilize the slope and promote accelerated erosion.

There is a considerable lack of knowledge about bluff stratigraphy in the Pennsylvania coastal zone. Since certain stratigraphic sites are more vulnerable than others to erosion and since certain layers contain a higher silt/clay fraction, it is imperative that coastal managers add this missing aspect to their knowledge base. It is important to examine bluff stratigraphy in sufficient detail to determine bluff height, slope, geometry, and stratigraphy including an analysis to determine percentage of sand, silt, and clay in each stratigraphic layer.

This project will build on an existing and evolving database. Since 1973, the Pennsylvania Coastal Zone Management Program has been actively involved in projects related to increasing the understanding of bluff erosion. The program has established bluff erosion control points every 0.5 kilometers along the Lake Erie shoreline. The amount of recession over the time period from 1982-1998 is known. Combined with the results of an analysis of sand, silt and clay in the stratigraphic layers found at each or alternating points will permit a formulation of estimates of sediment loading along the Pennsylvania reach. This information will provide the necessary basis for promoting erosion reduction programs with landowners, developers and municipalities.

## **ACTIVITIES**

Project personnel established a monitoring grid consistent with Pennsylvania Coastal Zone Management Program sufficient to provide for stratigraphic variations within each major reach. Gathered data include the GPS location, bluff slope, stratigraphic sections present, thickness of each section, degree of erodibility, presence of groundwater, vegetative cover, land use in the upland and the general geometry of each site. Project personnel have also collected samples of sediment from each stratigraphic unit to analyze for sand, silt and clay fraction composition. They are in the process of estimating the annual amount of sediment loading by volume based on bluff erosion rates.

## **RESULTS**

As a result of a macro and micro bathymetric (depth) analysis of the near shore profile, project personnel have been able to determine that the amount of sediment loading in the form of sand sized fractions is much less than originally anticipated. From monitoring recession on selected sampling stations, they have a very accurate determination of recession rates for the sample sites. Once analysis of the sediment samples has been completed, project personnel will have a very clear notion of the sediment loading to the lake itself from silt and clay fractions. This information will be published in a report containing maps, diagrams, and data including estimates of sediment loading in the coastal zone.

# WISCONSIN

<b>PROJECT TITLE:</b>	<b>BAD RIVER INTEGRATED RESOURCE MANAGEMENT PLAN DISSEMINATION PROJECT</b>
<b>GRANTEE:</b>	<b>BAD RIVER BAND OF LAKE SUPERIOR TRIBE OF CHIPPEWA INDIANS</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 4,554 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 3,125 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>CANCELED</b>

## PROBLEM STATEMENT

The Bad River Band of Lake Superior Chippewa (the Tribe) recognizes increased sedimentation as a pollutant degrading habitat, especially in areas of heavy logging. The Tribe has developed an Integrated Resource Management Plan to improve the water quality of the Bad River and ultimately Lake Superior by protecting riparian zones and ravines from land uses that increase erosion, particularly forestry practices.

## BACKGROUND

The unconsolidated glacial lake deposits in the Lake Superior Basin are very susceptible to erosion. The United States Geological Survey reported that the Bad River averaged approximately 20 percent of the total load of suspended sediment contributed to Lake Superior on an average day for the 1975 to 1990 period. A study on a local creek found that the greatest amount of deposition corresponded to the time period of historic clear cutting.

The Bad River Reservation is situated on the southern shore of Lake Superior with the exterior boundary of the reservation making up approximately one third of the Bad River watershed. The Reservation is largely forested with some agriculture and a population based mostly near Lake Superior. Increasing demand for housing and development has raised concerns for the protection of natural resources. Sedimentation, increased by human activity, can alter aquatic habitats and carry sediment to the Sloughs, a large, pristine wetland complex that empties directly into Lake Superior.

The Tribe has written an Integrated Resource Management Plan (IRMP) to protect the resources of the Reservation. The application of the IRMP within the Reservation lands will protect ravines and river banks from increased erosion and therefore greatly assist in maintaining natural sediment loads from the Bad River system into Lake Superior. This project will fund the printing and dissemination of the completed draft to local landowners and loggers.

## ACTIVITIES

The project was canceled at the request of the grantee. The Tribe is awaiting the approval of the Integrated Resource Management Plan by the Bad River Tribal Council. Therefore, copying and disseminating of the document could not be preformed during the grant period and the grant was canceled.

# **WISCONSIN**

<b>PROJECT TITLE:</b>	<b>FOREST ROAD BUILDING WORKSHOPS</b>
<b>GRANTEE:</b>	<b>FOREST INDUSTRY SAFETY AND TRAINING ALLIANCE</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 4,875</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 2,481</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 – JUNE 30, 2000</b>
<b>PROJECT TYPE:</b>	<b>INFORMATION AND EDUCATION</b>
<b>STATUS:</b>	<b>COMPLETE</b>

## **PROBLEM STATEMENT**

Although forest management does not produce the extent of non-point source pollution problems that agriculture does in Wisconsin, if best management practices are not followed in localized areas, improperly constructed or misplaced roads cause non-point source pollution problems.

## **BACKGROUND**

Improperly constructed or misplaced roads and roads that are not properly “put to rest” after logging operations are completed, cause non-point source pollution problems, especially in many of the terrain and soil types that are associated with drainage systems that empty into Lake Superior. Without the proper knowledge of how to construct cost-efficient and water resource friendly roads, roads currently being constructed will need rebuilding and constant maintenance and water resources will suffer from the effects of non-point source pollution.

## **ACTIVITIES**

The Forest Industry and Trade Alliance (FISTA) worked with six different forest industry companies to advertise and promote four training workshops and to identify field sites that demonstrated good or poor road building techniques for use at the workshop. FISTA staff and other instructors conducted workshops that included two to three hours of classroom instruction and five to six hours of in-the-woods instruction and discussion. Instructors included: resource conservationists and soil scientists from the Natural Resource Conservation Service (NRCS); water hydrologists and foresters from the Wisconsin Department of Natural Resources (DNR); foresters and road builders from the forest industry; and consulting foresters. Field sites included old roads, new roads, and roads under construction with a variety of issues and problems. FISTA gave participants a hand-book and handouts on various aspects of road building.

## **RESULTS**

A total of 83 equipment operators, logging contractors and foresters attended one of four workshops where they learned about tools such as topographic maps, aerial photos, soil surveys, and clinometers, and resource agents such as the NRCS, DNR hydrologists and consulting foresters of which many were previously unaware. The interaction of loggers, road builders and foresters helped each group better understand the unique challenges the other groups faced. Project staff estimate 200 additional loggers, foresters, and road builders will be reached beyond the grant period.

# WISCONSIN

<b>PROJECT TITLE:</b>	<b>PENSAUKEE RIVER WATERSHED RIPARIAN BUFFER PROJECT</b>
<b>GRANTEE:</b>	<b>SHAWANO COUNTY LAND CONSERVATION DEPARTMENT</b>
<b>BASIN PROGRAM FUNDS:</b>	<b>\$ 14,100 (APPROVED)</b>
<b>NONFEDERAL FUNDS:</b>	<b>\$ 13,050 (PROPOSED)</b>
<b>PROJECT DURATION:</b>	<b>JULY 1, 1999 -</b>
<b>PROJECT TYPE:</b>	<b>DEMONSTRATION</b>
<b>STATUS:</b>	<b>ONGOING</b>

## PROBLEM STATEMENT

The surface water resources in the Pensaukee River Watershed show extensive nonpoint source pollution problems. Agriculture comprises about 70 percent of the overall land use. Because of the topography and the current farm conservation practices already being applied, staff will focus on keeping all cropped fields within a specified soil loss in order to reduce sediment delivery to drainage ditches, other tributaries, the Pensaukee River and ultimately to Green Bay.

## BACKGROUND

The predominant sources of nonpoint source pollutants in the Pensaukee River Watershed originate on croplands in the forms of excess phosphorus, nitrogen and sediment. Establishing vegetated buffer strips will provide significant protection to the water resource by delaying, absorbing and/or purifying contaminated runoff before it enters watershed streams and lakes. This project will provide cost-share assistance for landowners who install and maintain riparian buffers on their property.

## ACTIVITIES

In order to tell the community about the project, staff advertised the award for establishing buffers in the Pensaukee River Watershed's biannual newsletter. They produced a map using Geographic Information Systems to target fields adjacent to intermittent and perennial streams. Project staff mailed eight landowners information about vegetated buffers, including a map of their property with the streams delineated with 35 foot by 100 foot buffers. Five of these landowners have met with project staff to discuss the project in more detail, four have made verbal commitments and two have signed contracts to establish buffers on their property, for a total of 12.8 acres of riparian buffer. Project staff assisted in installing 3.75 acres of riparian buffer.

## RESULTS

The 3.75 acre riparian buffer that has been installed will reduce sediment delivery to a tributary of the Pensaukee River and ultimately the Green Bay. Project personnel estimate 22.5 tons of soil, 225 pounds of phosphorous and 45 pounds of nitrogen will be saved over the ten-year project. The riparian buffer has also improved wildlife habitat by enhancing the tributary corridor and has improved water quality by filtering sediments and other pollutants. The implementation and maintenance of additional buffers will also decrease peak flooding and increase infiltration into the soil.

## **VI. PROGRAM YEAR 2001 APPROVED PROJECTS**

### **INDIANA**

***Forestry BMP Implementation in Great Lakes Basin, Indiana DNR – Division of Forestry, \$24,300***

Indiana DNR – Division of Forestry will seek to reduce the amount of erosion and sedimentation that results from timber harvesting operations in northern Indiana Counties through increasing the awareness, implementation and monitoring of forestry best management practices. Contact Jeff Settle, (317) 232-4115.

***Lower St. Joseph River Vegetative Buffer Project, St. Joseph River Watershed Initiative, \$24,605***

This project will increase the number of buffers in the St. Joseph River Watershed in order to decrease the amount of sediment, pesticides, nutrients and pathogens leaving agricultural land and entering the river and its tributaries. Contact Jon Bickel, (219) 426-4637.

### **MICHIGAN**

***Erosion and Sediment Control on Non-Agricultural Property, Clinton County Conservation District, \$19,760***

This project intends to promote buffer/filter strip implementation on non-cropland properties in order to control erosion and sedimentation. District staff will provide technical and financial assistance to facilitate the establishment of buffer/filter strips by riparian landowners. Contact Christine Corgan, (989) 224-8769.

***“Great Lakes Better Backroads”, Initiative Phase III, Huron Pines RC&D, Inc., \$20,000***

Huron Pines RC&D, Inc. will further the education of agencies and planners responsible for road maintenance in Michigan and the Great Lakes region with an attempt to standardize BMP's for use in all backroad stream-crossing situations in the Great Lakes area. Contact Brian Benjamin, (517) 348-9319.

***Industrial Site Erosion Control with Native Prairie Grass Plantings, Kalamazoo Conservation District, \$17,853***

This project will implement and monitor the efficacy of native tallgrass prairie plantings versus conventional plantings for erosion control at a highly eroding, industrial site along the banks of the Kalamazoo River. Contact Kathy Buckham, (616) 327-1258.

***Sediment Reduction on the South Branch of the Boardman River, Grand Traverse Conservation District, \$21,160***

The goal of this project is to eliminate sediment loading from one of the worst erosion sites on the South Branch of the Boardman River. Eliminating introduction of sediment at this site through regrading and paving the existing road surface and directing stormwater away from the river into an adjacent wetland, will save the county thousands of dollars in sand trap maintenance costs and improve water quality and trout habitat. Contact Steve Largent (231) 941-0960.

***Soil Erosion Control Practices along Detroit's Urban Waterfront, Detroit/Wayne County Port Authority, \$25,000***

The Detroit/Wayne County Port Authority will produce, demonstrate and document the use bioengineering techniques for reducing soil erosion and rehabilitating the shoreline along the Detroit River - one of 14 federally designated American Heritage Rivers. Contact John Kerr, (313) 331-3842.

***Thunder Bay River Watershed Habitat and Protection Project, Montmorency Conservation District/Thunder Bay River Restoration Committee, \$ 12,976***

This project will seek to stabilize eight eroding sites, such as river banks, road/stream crossings and other sources of sediment, on the Thunder Bay River in order to minimize non-point source pollution and prevent new impacts from occurring. Contact Donna Hardies, (517) 785-4083.

***Upper Tabquamenon River Restoration Project, Tahquamenon Sportsman's Club, \$4,270***

This project will abate existing streambank erosion problems in the headwater areas of the Tahquamenon River by relocating fallen trees to stabilize streambanks, improve and redirect water flow and provide trout habitat. Contact Paul Rose, (517) 742-4225.

## **MINNESOTA**

***Environmental Guidelines for Access Roads and Water Crossings, Minnesota Erosion Control Association, \$7,500***

Under this grant, the Minnesota Erosion Control Association will conduct two training sessions and field trips to train local governments, loggers and decision makers in the Lake Superior Watershed on how to properly plan, construct and maintain access roads to minimize impact on the environment. Contact Mark Nelson, (218) 723-4752.

***Miller Creek Wetland Inventory and Functional Analysis, South St. Louis County SWCD, \$9,675***

The South St. Louis County SWCD will inventory and evaluate the functions of all watersheds in the Miller Creek Watershed in order to prioritize the wetlands and develop a long-range plan to protect high priority wetlands and restore those that are degraded. Contact R.C. Boheim, (218) 723-4867.

## **NEW YORK**

***Erosion and Sediment Control: Cayuga Lake Watershed, Tompkins County Soil and Water Conservation District, \$20,250***

The Tompkins County Soil and Water Conservation District will purchase a no-till grass seeder and work with agricultural landowners throughout the watershed to demonstrate soil loss reduction from erosion. The no-till grass seeder will be made available for use by producers in the region, resulting in a reduction of acres under conventional tillage. Contact Craig R. Schutt, (607) 257-4320.

***Road Ditch Geotextile Demonstration Projects, Chemung County Soil and Water Conservation District, \$ 13,500***

This project will demonstrate the use of geotextile materials combined with organic materials in stabilizing eroding highway ditches. Project staff will communicate the results to Chemung County and town highway superintendents, who can then implement the demonstrated soil erosion control methods. Contact Mark Watts, (607) 739-2009.

## **OHIO**

***Urban Stormwater Wetland Sampling Demonstration, Summit Soil and Water Conservation District, \$21,225***

Summit Soil and Water Conservation District will monitor two existing stormwater wetlands to determine the effectiveness of stormwater wetlands in removing nonpoint source pollutants from concentrated urban stormwater runoff and to compare the efficiency of the two wetlands as they had significantly different construction costs. Contact Dave Ritter, (330) 929-2871.

## **PENNSYLVANIA**

### ***Cascade Creek Bank Stabilization and Erosion Control, Erie-Western Pennsylvania Port Authority, \$24,000***

The Erie-Western Pennsylvania Port Authority will significantly reduce soil erosion and sedimentation occurring in a highly urbanized area of Cascade Creek by using natural materials and bioengineering methods to stabilize land above the streambank. Contact Thomas Maggio, (814) 455-7557.

### ***Design and Evaluation of a Sediment Basin Dewatering Device, Albert R. Jarrett, Professor of Agricultural Engineering at the Pennsylvania State University, \$27,734***

This project will design and evaluate a dewatering control device that can be used in place of the traditional spillway on sedimentation basins. This new device has the ability to limit outflow when the basin's water depth is great and the sedimentation concentration is the greatest, thereby increasing the amount of sediment captured. Contact Albert R. Jarrett, (814) 865-5661.

### ***Headwaters Park Educational Monitoring Station, Erie County Conservation District, \$24,600***

Erie County Conservation District will establish a permanent, instructional, monitoring station that can be used by teachers, students and others to learn about stream assessment techniques. They will also reduce the amount of sediment entering the stream by demonstrating a variety of best management practices upstream of the monitoring station. Contact LeRoy Gross, (814) 796-6760.

## **WISCONSIN**

### ***Demonstration of Streambank Stabilization from Submerged Vanes, Wisconsin Department of Natural Resources, \$25,000***

This project will demonstrate the effectiveness of an instream restoration technique (submerged vanes on the channel bed) for reducing soil erosion and improving aquatic habitat at two sites on North Fish Creek, a Wisconsin tributary to Chequamegon Bay, Lake Superior. Contact Kim Walz, (608) 264-9220.