Proceedings of

Keeping it on the land . . . and out of the water!

Soil Erosion and Sediment Control Opportunities for the Great Lakes Basin

Toledo, Ohio

September 16-18, 1998

Acknowledgments

This conference and proceedings were made possible through the financial support and cooperation of the following organizations:

Great Lakes Commission
National Association of Conservation Districts – Great Lakes Committee
U.S. Environmental Protection Agency, Great Lakes National Program Office
U.S. Army Corps of Engineers
U.S. Department of Agriculture – Natural Resources Conservation Service
Ohio Department of Natural Resources
Great Lakes Science Advisory Board, International Joint Commission
Great Lakes Soil Erosion and Sedimentation Task Force

This summary proceedings document was prepared by staff members of the Great Lakes Commission working with the more than two dozen individuals who delivered presentations at the conference. The statements presented within are comprised of abstracts, full text presentations or transcripts. Each statement has been edited to enhance consistency within the proceedings document. The Great Lakes Commission acknowledges the support and involvement of the project steering committee, which met tirelessly during the spring and summer months of 1998 to plan and prepare for this conference. Specifically, the Commission thanks the following individuals who served on this committee: Jim Birkholz, Minnesota Board of Water and Soil Resources (BWSR); Jim Bredin, Michigan Department of Environmental Quality; David Cowgill, U.S. EPA-Great Lakes National Program Office (GLNPO); Bill Horvath, National Association of Conservation Districts (NACD); Bruce Kirschner, International Joint Commission (IJC); Percy Magee, USDA-Natural Resources Conservation Service (NRCS); Jan Miller, U.S. Army Corps of Engineers; Roger Nanney, NRCS/U.S. EPA-GLNPO; Maurine Orndorff, NACD Great Lakes Committee, Ohio; Ron Shelito, Minnesota BWSR; and Jerry Wager, Ohio Department of Natural Resources.

The principal editor of this report is Jennifer Read, formerly Program Specialist with the Great Lakes Commission and currently with the Great Lakes Institute for Environmental Research (GLIER), University of Windsor, Windsor, Ontario. Special thanks go to Commission staff members Matthew Doss and Thomas Crane for their support to the conference steering committee and oversight of logistical arrangements for the conference. Additional thanks go to Rita Straith, Commission manager of support services, who formatted this document. Appreciation is extended also to Peter Murchie, U.S. EPA Region 5 and liaison to the Great Lakes Commission (8/98 through 2/99) for his hard work at the conference, and to Dr. Michael J. Donahue, Commission executive director, who provided constant guidance and oversight throughout the planning process.

Introduction

Soil erosion and sedimentation are significant contributors to Great Lakes nonpoint source pollution. Erosion compromises agricultural production through the loss of valuable soil, while associated sedimentation interferes with navigation, water-based recreation and the efficacy of water treatment facilities. Water quality managers have long understood the importance of controlling erosion from an on-site soil savings standpoint. Recently the emphasis has shifted toward trying to understand the off-site impacts that sedimentation has on water quality, fish and wildlife habitat, and infrastructure. In the Great Lakes region, numerous studies and research projects have been conducted and numerous workshops and conferences held to help soil and water conservation professionals better understand the connection between water quality, soil erosion and sedimentation, and urban and rural land use practices. In 1987, a regional Task Force, assembled by the Great Lakes Commission, released a report entitled Soil Erosion and Sedimentation in the Great Lakes Region. The report documented the serious nature of the basin's nonpoint source pollution problems and presented a series of findings and recommendations which addressed the funding problems, program development, education, partnerships, standards, controls, and research and evaluation aspects of soil erosion and sediment control. This report also provided the impetus for the creation of the federal/state Great Lakes Basin Program for Soil Erosion and Sediment Control. The Basin Program was implemented in 1991 to address comprehensive, basin-specific soil erosion and sedimentation control through a demonstration grants program and a regional information/education program focusing on the importance of Great Lakes nonpoint source pollution issues.

With funding provided by the U.S. EPA and the USDA-NRCS, 140 grants have been distributed to state and local governments and other recipients in all eight Great Lakes states totaling nearly $4.3 million. Over its nine year history, the Great Lakes Basin Program has funded projects dealing with agricultural erosion control, streambank and shoreline stabilization, road/stream crossing problems in rural areas, urban construction site erosion control and information/education activities. Many of the specific projects were highlighted at this conference.

The idea to convene this regional conference was developed by the NACD Great Lakes Committee, U.S. EPA's Great Lakes National Program Office and the Great Lakes Commission's Soil Erosion and Sedimentation Task Force. These groups saw great value in bringing soil and water conservation professionals together to hear success stories, discuss current and emerging issues related to erosion and sedimentation control efforts, and learn from managers and researchers living and working in different parts of the Great Lakes basin. It builds on the efforts and successes of several previous regional conferences including: *Protecting the World's Greatest Freshwater Resource: the Great Lakes,* sponsored by the Soil and Water Conservation Society in November 1989; *Water Quality and Land-Use Linkages: An Information/Education Strategy for the Great Lakes Basin,* sponsored by the U.S. EPA and Great Lakes Commission in October 1992; and *Building Partnerships to Improve Great Lakes Water Quality through Soil Erosion and Sediment Control,* sponsored by the Great Lakes Commission, NACD Great Lakes Committee and Ohio Department of Natural Resources. These conferences all focused on specific aspects of soil erosion and nonpoint source pollution control, but did not emphasize the technology transfer and information sharing components that formed the basis of this 1998 conference.

Keeping it on the land. . .and out of the water!, was planned to bring together representatives of public agencies, academic institutions, citizen groups and the private sector with responsibility for soil erosion and sediment control related to water quality, agriculture, marine transportation and other resource uses. The conference program included key-note addresses on issues of basinwide concern, the conference provided presentations of case studies focusing on different aspects of the erosion and sedimentation problem. In addition to acquiring valuable erosion control information, conference participants were able to create and strengthen the personal connections upon which successful coalitions and partnerships are built.

Several related events were planned in conjunction with *Keeping it on the land. . . and out of the water!* The International Joint Commission's Great Lakes Science Advisory Board hosted a symposium titled *Opportunities and Obstacles in Nonpoint Source Pollution Control: A Post PLUARG Perspective*, and the Great Lakes Dredging Team sponsored a workshop on the *Beneficial Use of Dredged Material*. The agenda and attendance lists of both meetings are appended to these proceedings (see Appendix One and Appendix Two). Other related events included business meetings of the Great Lakes Dredging Team, Great Lakes Soil Erosion and Sedimentation Task Force, and National Association of Conservation Districts–Great Lakes Committee.

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Keynote Address

An Ecosystem Approach to Water Quality Management in the Great Lakes

Ron Nargang, Minnesota Department of Natural Resources

This talk begins with an outline of Minnesota experience managing resources in large natural systems which can be applied to other such areas within the basin. The Minnesota Department of Natural Resources (DNR) is a large agency with 3,700 staff at its peak capacity. DNR responsibilities include: managing fish and wildlife; regulating forests; coordinating over 10 million acres of mineral rights; water appropriation within the state; and alterations to watercourses. The agency has its own law enforcement arm and is the fourth largest landowner in the United States.

Eight years ago, DNR decided to integrate resource management. This meant coordinating across the traditional program structure, i.e. the single resource/issue chimneys within which programs were traditionally implemented, such as fish and wildlife, or water resources, or forests. In an integrative exercise, DNR engaged other non-traditional actors in the management process. What follows is how DNR launched the program and a status report on where the program is at the moment.

Overarching Concepts of the Ecosystem Approach

1) *Sustainability* is the desired outcome

The goals of sustainable development, or a sustainable society, are to develop sustainable communities and industries that ensure a sustainable ecosystem. A problem with traditional resource management is that it does not include human beings within natural systems. The crux of a sustainable society, therefore, is to conceptualize and manage natural systems; that include human beings in the equation. This is a significant point: social challenges are often the most important challenges to implementation.

An important component of a sustainable society is sustainable communities. These have healthy economies based upon healthy industry. This is an important distinction because these kinds of initiatives require funding. Sustainable industries require sustainable yields of natural resources, but the only way to ensure that is to manage the whole system in which those resources exist. The resulting sustainable ecosystem requires thinking on a broad scale and incorporating all of these elements.

In Minnesota, this meant engaging the governor to implement a sustainable development initiative. The goal is to meet the needs of the present generation without compromising the ability of future generations to do the same.

2) *Ecosystem-based Management* is the methodology

Ecosystem-based management is composed of partnership and collaboration, involvement of all stakeholder groups, and scientifically-based management. Partnerships enable DNR to meet the

increasing demand for local services. DNR is trying to pull together everybody who has some role in the management process, combine resources and meet the demands coming from the public.

Another key component of ecosystem-based management is the need to involve all the stakeholder groups. They must be identified and brought to the table so that they work with the process instead of against it. One of the biggest challenges is the way government agencies are organized. They are based upon an hierarchical, military model that has one person in command, with staff who deliver consistent services the same way everywhere, every time. Unfortunately, ecosystem management is not about this. Instead, it must be flexible to meet the unique needs of the resource and the community.

Management based on sound science is the key to flexibility. Increasingly, science is the only real truth that can be brought to the table. Often, an issue generates two apparently intractable sides and the common ground to get them talking is science. What we aim to do must be ecologically sound as well as economically and socially acceptable. We have to be aware, however, that we do not have the complete scientific picture and one of the first things that we will realize is that there are large gaps in our knowledge base which will have to be filled in order to make sound decisions.

3) Ecological Integrity is the measurement of success

Biological indicators are used to determine the health of the basic resource. For example, DNR uses the status of its timber wolf population and bald eagle breeding areas in order to gauge the effectiveness of timber harvesting techniques. Since the forests provide the key habitat area for both species, their status is indicative of the overall viability of the forest ecosystem we are managing.

Challenges to Ecosystem-based Management

It is important to ensure that everyone with a stake in the process, resource or the community is involved in decision-making, otherwise they can work against the process. As a related concept, public opinion is important because the public ultimately pays for these programs and so must support them. Government organizational structures must be flexible in delivering programs and have the ability to adapt programs to the local situation. Personnel within the line agencies who must re-think how they deliver programs are faced with learning sometimes dramatically different approaches to their work. At the same time, ecological knowledge gaps are important because the first thing that a scientifically based approach will face is the gaps in the knowledge and the need to fill them.

For more on Minnesota's approach please see: www.dnr.state.mn.us/ebm/

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Challenges and Opportunities for Soil Erosion and Sediment Control in the Great Lakes Basin

Moderator: Jerry Wager, Ohio Department of Natural Resources

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U.S. Department of Agriculture - Natural Resources Conservation Service

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Francine Norling, U.S. Environmental Protection Agency

The Clean Water Action Plan: What Does it Mean for Nonpoint Source Pollution Control in the Great Lakes?

Dov Weitman, Nonpoint Source Control Branch, U.S. Environmental Protection Agency

The Clean Water Action Plan was initiated in October 1997 by Vice President Al Gore in response to the fact that almost 40 percent of water bodies assessed by state water quality agencies are still inadequate for fishing, swimming and drinking. The federal agencies responsible for pollution control were given 120 days to develop a plan to address the problem of ineffective programs. This initiative is not legislative in approach, rather it is an attempt to develop a better, more effective job with the existing legislative and programmatic tools.

Watershed Approach

The Clean Water Action Plan is a watershed-based approach. The first step is to reconcile the myriad of programs and initiatives that have been used to identify priority watersheds. One is Unified Watershed Assessments, which identify watersheds needing to be restored, watersheds requiring preventative actions to sustain water quality; and pristine watersheds on federal land that require extra protective measures. Next, Watershed Restoration Priorities are set. These enable a federal commitment to focus on the priority watersheds as identified by the states. States are developing restoration action strategies focusing on these areas. The goal of both processes is to enable both state and federal agencies to focus their resources.

Improvement of Existing Federal Authorities

1) Clean Waters, Healthy People

The focus of this initiative is twofold: fish and shellfish consumption and beach safety. Responsible federal agencies will survey and publicly report findings to outline what is safe to eat, where it is safe to swim, and the actions needed to address the problems associated with each of these areas.

2) Enhancing Natural Resources

This aspect brings a renewed focus on stewardship of federal lands and resources in an effort to restore damaged riparian areas. Federal agencies have established specific, numerical goals for riparian mileage and wetland acreage to be restored.

3) Strengthening State and Tribal Nonpoint Source Programs

Each state has an approved Section 319 program under the federal Clean Water Act. These have generally been demonstration programs usually implemented on the sub-watershed level. Congress has indicated that it will increase funding for these programs 50 to100 percent over the next year. As part of that, the states are required to form and strengthen their working partnerships with all the interested groups in the state. This requirement can be achieved through task forces and other mechanisms. Existing water quality standard regulations require a state to specify economic or social reasons for issuing a permit that will degrade existing water quality. U.S. EPA is working on a

policy document to provide guidance to the states on how new uses might interact with existing ones on a watershed basis.

Other U.S. EPA initiatives include the Phase 2 Stormwater Permit Program. The U.S. EPA has written the rules and is currently receiving public comment. Phase 2 is intended to enhance existing programs for construction, bring smaller cities into the system, and address smaller construction sites than before.

The U.S. EPA is also working on reducing nutrient over-enrichment. The goal is to establish water quality criteria on a nutrient basis that will determine the levels of nitrogen and phosphorus damaging the aquatic environment. These criteria are ecosystem dependent and must be determined on an ecosystem basis. Developing criteria will require significant public involvement to ensure that the standards set for a particular watershed will be appropriate for the resource uses in that area.

Information on State/Local Nonpoint Source Programs

The nonpoint source pollution control program is non-regulatory at the federal level. The U.S. EPA depends upon state and local programs to regulate in this area. Recently, many states have begun to address the problem of animal waste even below the level addressed through the National Pollutant Discharge Elimination System (NPDES) permit program. The new joint USDA–EPA strategy to address contained animal feeding operations proposes a range of services including technical assistance, financial assistance, sample regulations and enforcement strategies. Animal waste remains a significant factor in water quality impairment and this strategy is aimed at more fully developing our tools to address the situation – technical, monitoring, and regulatory. As an aid to state initiatives, the U.S. EPA is gathering and providing information about the various enforcement authorities being used around the country. The Environmental Law Institute is writing a report on this topic as well.

Airborne deposition is an emerging issue with social, political, economic and scientific aspects that will prove challenging.

Finally, information is the key – both in the amount and how it is disseminated. The U.S. EPA believes strongly in citizens' right-to-know and has developed several mechanisms to facilitate that process. The U.S. EPA website, www.epa.gov has links to more than 2,000 watersheds throughout the country. For each watershed, an index of watershed indicators provides up to 15 layers of information on the ecosystem health of that watershed and these information layers are being updated all the time.

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Other Federal Programs for Managing Nonpoint Source Pollution

Hiram Boone, Gulf of Mexico Program, U.S. Department of Agriculture - Natural Resources Conservation Service

Your theme, "Keeping it on the land...and out of the water," is the goal of the U.S. Department of Agriculture and conservation districts. As a team, we can accomplish this goal.

Confined Animal Feeding operations: What Can We Do?

Everyone must understand the animal feeding issue, both the environmental aspects that ensure public health, safety and environmental quality, and those aspects reflecting livestock production. In order to address the issue and the potential for conflict, it is clear that actions must be based on sound science and a full participatory process. Having facts and learned participation is critical to identifying the real problems and solutions.

The Natural Resources Conservation Service (NRCS) Conservation Technical Assistance program is the cornerstone of the U.S. Department of Agriculture (USDA) conservation program, and it is built on sound science, technical standards, and locally led conservation. The USDA has programs available to help producers and communities address these concerns in a voluntary, incentive-based manner.

A. Joint Efforts - U.S. Department of Agriculture/U.S.EPA

The U.S. EPA issued a Confined Animal Feeding Operations (CAFO) strategy on March 5, 1998. During this time period, the U.S. EPA received over 200 comments. At the beginning of May 1998, it was agreed that a joint unified strategy would be developed by USDA - EPA for CAFO. In this strategy, the USDA and U.S. EPA would look at environmental and public health impacts. The more than 200 comments that U.S. EPA received will be considered in the joint strategy.

Also, the strategy considers not only the facility but the land where manure can be spread, and encourages that the land be under a Comprehensive Nutrient Management Plan prepared by NRCS or a certified consultant. It also recommends that local conservation districts use a voluntary, incentive-based approach to develop a locally led process which assists landowners. I suggest that each of you consider attending a conservation district board meeting or go by your local office to find out what programs and services are available.

USDA will use a voluntary incentive-based, locally-led approach effort. The U.S. EPA will maintain a regulatory role for "bad actors" and both will work toward a voluntary approach. We will have the draft of the joint strategy out for public comment in the near future. It will be in the Federal Register for review and comment. During the comment period, meetings will be held around the country to get public input. I encourage all of you to attend if possible.

Privacy of Data Issue

Senator Harkin from Iowa convened a National Summit on Animal Waste on May 5, 1998. He asked USDA Secretary Dan Glickman and U.S. EPA Administrator Carol Browner to address issues associated with the privacy of producers' individual data. I quote Secretary Glickman, "Maintaining the trust of the private landowners that work with us in a voluntary way is our first priority. We will

lose that trust if landowners believe, rightly or wrongly, that working with us means that they will end up subject to regulatory scrutiny or that private information about their operations will be available to the public. We need to keep a firewall between voluntary and regulatory programs. Landowners need to know when they come to us for help, voluntarily, to solve a problem that they won't be punished for coming forward. Otherwise, the voluntary, incentive-based approach that we hope can solve most of our problems, just won't work."

Also, I quote Administrator Browner in saying, "'At the same time, preserving the trust relationship between USDA and farmers is vital. USDA should maintain the privacy of conservation plans developed between USDA and farmers and other farm level information. And, EPA should not and will not ask USDA for this information."

The USDA will work with our clients and assist them in preparing a total conservation plan. We will provide them a copy. We want our clients to be good stewards of their resources. If a regulatory agency, state or federal, requests a copy of their plan, it will be the responsibility of the landowner to provide the information, not USDA.

We will use the Core 4 Practices – conservation tillage, nutrient and pest management, conservation riparian buffers and grazing land management – as part of the solution. Information on these are available through the Conservation Technology Information Center (CTIC) in West Lafayette, Indiana.

B. USDA Efforts/Programs

Here is an overview of the the USDA cost-share programs that address animal waste and are available to the landowner:

1) Environmental Quality Incentives Program (EQIP)

EQIP is a new voluntary USDA conservation program for farmers and ranchers who face serious threats to soil, water, and related natural resources. It provides technical, financial, and educational assistance primarily in designated priority areas. Priority areas and environmental statewide concerns are identified by each state conservationist. Local work groups identify and submit applications for priority areas to the state conservationist. With advice from the State Technical Committee, the state conservationist ranks and approves EQIP priority areas. EQIP dollars are focused on those areas. Fifty percent of EQIP dollars are targeted to livestock related natural resource concerns and the remainder to other significant conservation priorities. The program provides assistance to landowners in complying with federal, state and tribal environmental laws.

Applicants to the program are ranked by a point system based on environmental benefits and outcomes. Based on this, five to ten-year cost-share contracts are made with producers to implement one or more eligible structural or vegetative practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement nutrient, pest, grazing land and irrigation water management.

2) Conservation Reserve Program (CRP)

The CRP is highly competitive and maximizes environmental benefits. There is a continual review process for riparian buffers and grass waterways. The groups involved include Two by Two, National Buffer Councils and the National Corn Growers Commodity Groups.

The purpose of the CRP is to reduce soil erosion, protect the nation's ability to produce food and fiber, reduce sedimentation in streams and lakes, improve water quality, establish wildlife habitat, and enhance forest and wetland resources. It encourages farmers to convert highly erodible crop land or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife planting, trees, filter strips or riparian buffers. Farmers receive an annual rental payment for the term of the multiyear contract.

3) Other programs

Other USDA programs include Conservation Reserve Enhancement Program, which is the same as the CRP, but emphasizes state-identified priorities as long as they agree with national priorities. States contribute 20 percent of the cost and contribute applications for USDA review and approveal. Backyard Conservation (1-800-landcar) is an important program, as well as Farm-A-Syst-Self Evaluation, and Home-A-Syst-Self Evaluation. Contact your local conservation district office for other cost-share programs, such as the Wildlife Habitat Incentives Program and Wetlands Reserve Program.

There are many tools for county officials to help ease the tension and conflict associated with concentrated feeding operations. These include cooperation with the soil and water conservation district, watershed-based planning, zoning to keep feeding operations on appropriate soils and landscapes, participation on EQIP local work groups, and use of EQIP to install best management practices to control and manage animal waste. They can also ask livestock producers, local farm organizations and agribusinesses to speak to the public and at board meetings. County government leaders and civic groups can visit livestock operations and emphasize the fact that confined livestock producers must follow state and federal regulations on waste management. County officials can showcase successful livestock waste management facilities. The USDA is doing research to improve feeds for livestock and poultry to reduce the amount of phosphorous and trace elements in manure.

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Lakewide Management Plans and Other Approaches to Water Quality Management in the Great Lakes

Francine Norling, U.S. Environmental Protection Agency

The purpose of this talk is to bring us all up to speed on Lakewide Management Plans (LaMPs) and Remedial Action Plans (RAPs), and to try to encourage you to get involved in these programs. The speakers to date have helped make this talk easy because of their encouragement for an ecosystem approach, focus on partnerships and providing the broad context in which we are all working.

What is a LaMP?

A Lakewide Management Plan (LaMP) is a management strategy for the restoration and protection of the beneficial uses of our Great Lakes. Beneficial uses refer to the uses of the lakes that are valued by society, such as clean drinking water, safe beaches, and fish that we can eat. The process that we're using actually is the one that has been talked about here already. We are coordinating the various levels of government–federal, state, local, tribal–as well as interested members of the public around each of our lake basins for our Lakewide Management Plans. It is challenging and sometimes difficult to get all the people involved, but we have felt for a long time here in the Great Lakes that this is the right way to protect our lakes for the future. The primary participants to date have been the water quality and natural resource management agencies. This may sound easy, but it is actually a great step forward. We do have NRCS and our fisheries managers involved, along with our water quality managers. And the dialogue that goes on between us, as we are developing our plans, has helped us understand one another and work together.

Why do we create LaMPs? For those of you that are concerned about the legal or policy basis for our program, this dates back to 1987. That year we amended the Great Lakes Water Quality Agreement between the governments of the United States and Canada to take on both Lakewide Management Plans and Remedial Action Plans. It has taken us a while to get going, but we are now underway.

The scope of our work

All of the Lakewide Management Plans to date include a focus on toxic pollutants, and this comes directly from the language in the Great Lakes Water Quality Agreement. Toxics still are a significant problem in the Great Lakes, but we have also come to understand that there are several other issues we need to deal with to continue to have sustainable Great Lakes. These other issues include habitat loss, biodiversity, nutrients and exotic species. We have wonderful opportunities for bringing together a lot of different agencies and members of the public in our LaMP groups, and we are evolving to address these issues within the LaMP process.

There are various stages for producing LaMPs. Most of the LaMPs are focusing on *Stage 1* problem definition. One of the big challenges when dealing with ecosystem management of a large system, is having the right science. The US. EPA has found that even defining the current status of our problems can be challenging. The way we are doing this is by analyzing the status of impairments to the beneficial uses of our Great Lakes, and there are 14 specific impairments listed in the Water Quality Agreement on which we focus. We are also developing ecosystem objectives, which is another part of clarifying our problem definition. We are gathering information on sources and loads of the various toxic pollutants to the Great Lakes and we are trying to put together a lot of different databases, with different detection limits. Many of these databases were developed for different purposes. The other aspect of developing our problem definition is

bringing the public in early into these processes. We have learned in the Great Lakes that this is a very important thing to do. All of the LaMPs managed in the Region 5 Chicago office have public forums. These include volunteers representing a wide variety of sectors of the public who come to meetings, review a variety of documents and, in some cases, especially in the Lake Superior basin, actually initiate their own projects to restore and protect the Great Lakes. EPA Region 2 (covering Lake Ontario) uses a slightly different approach but they also have had extensive public involvement from early on in their process.

The *second stage* of the LaMP process, which we all hope to be getting to soon, is evaluating the measures that are needed to restore and protect beneficial uses. That includes developing a schedule for reducing the loads of various toxic pollutants of concern. *Stage 3* is actually selecting actions to remediate the impaired uses. *Stage 4*, that we all hope to get to, is monitoring for measures of success.

Polluted run-off, soil erosion and sediment control are definitely within the scope of our Lakewide Management Plans because there are many examples of where these sources impair beneficial uses. The LaMPs provide an opportunity for joint commitments to address these particular problems. It is really these joint commitments that are going to be bringing in the funds to address these problems. In terms of the nexus of this work with the Clean Water Action Plan, we are certainly hoping that the Great Lakes states will be nominating many of our Great Lakes watersheds for high priority. We hope there will be a nice fit between our program and the additional funding that we hope will come in through the Clean Water Action Plan.

I will use Lake Erie as an example of problems that we know have been caused in the past or are being caused by polluted run-off or soil erosion. The U.S. EPA is hoping to release a status report fairly soon on our research to date. With just some preliminary work, we know there are still lakewide fish advisories and some wildlife consumption advisories for PCBs and pesticides. And, we know that in the past and currently in the Maumee River area, these problems have been caused by leachate from landfills and, in the case of pesticides, from soil erosion. There still is degraded wildlife habitat within the Lake Erie basin, and there are problems with beach habitat and beach erosion. There is degraded fish habitat, especially in the near shore zones, from soil erosion and sedimentation that are still being dealt with. Eutrophication as a problem has not completely gone away. I think all those who have worked on addressing the eutrophication problem in Lake Erie, are very proud of that work over the last 20 to 25 years. I think this is a stellar example of groups working together to address a lakewide problem. But there are still areas of eutrophication in the near shore zones. On the other side of the coin, there are some people who are questioning whether phosphorus has been reduced too much in some areas of the lake. It is quite a lively conversation that we are having on this issue right now with our fishery interests and various water quality interests.

Status of the different LaMPs

- ***Lake Erie:*** Stage 1 is being developed along with the problem definition for the LaMP. We will know by this fall when those reports will be out. In late October, a status report on the Lake Erie LaMP will be released. Contact: Francine Norling, U.S. EPA Region 5, (312) 886-0271.

- ***Lake Michigan:*** The draft of Stage 1 has been expanded by incorporating other issues beyond toxic pollutants. Contact: Judy Beck, U.S. EPA Region 5, (312) 353-3849.

- ***Lake Superior:*** Stage 1 has been completed and Stage 2 is being developed. A draft of the Stage 2 document is available with the final report expected in Dec. 1998. Stage 3 work will then begin. There are also a number of pollution prevention measures that have been taken through that program as well. Contact: Janet Pellegrini, U.S. EPA Region 5, (312) 886-4298.

- ***Lake Ontario:*** Stage 1 was completed in June 1998. The report is available through the U.S. EPA web site. Contact: Barbara Spinwebber, U.S. EPA Region 2, (212) 637-3848.

- ***Lake Huron:*** There is no Lakewide Management Plan for Lake Huron, but there have been some very important ecosystem initiatives, especially within Saginaw Bay. Michigan Department of Environmental Quality is looking into some creative ways to address Lake Huron without going into the full LaMP process right now.

Remedial Action Plans

The impetus for this initiative again comes from the Water Quality Agreement. The Agreement calls for a comprehensive ecosystem approach to restore areas that have been designated as Areas of Concern within the Great Lakes basin due to the presence of toxic contaminants or other impairments to beneficial uses. Why were these programs developed? There are 43 Areas of Concern that were designated by the International Joint Commission (IJC) in partnership with the states, provinces and federal governments of the U.S. and Canada. Each Great Lake has at least one Area of Concern. RAPs have three stages of implementation. The first one is the basic problem definition. The second is similar to the ecosystem objective to set water quality goals and establish various alternatives for actually reaching those goals; and Stage 3, the one everyone's looking forward to, is restoring those uses and monitoring for success.

There are certainly opportunities to address the conference topic within the RAP process. Rather than describing a lot of those opportunities in this talk, I will direct you to a web site: www.epa.gov/glnpo/aoc/. This provides good information on all of the Areas of Concern. In conclusion, both our Lakewide Management Plans as a broad context and our RAPs, in a more localized context, do provide opportunities for pursuing an ecosystem approach and developing the partnerships that are important for progress and improvements within the Great Lakes basin. And, we always welcome new participants, so I hope that you all will become involved to continue to improve our Great Lakes.

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Keynote Address

Watershed Planning in an Urban Environment: Approaches for Addressing Development, Imperviousness and Soil Erosion

Thomas Schueler, Executive Director, Center for Watershed Protection, Inc.

Urban streams are arguably the most extensively degraded and disturbed aquatic systems in North America. Research over the last two decades has revealed that urban development has a profound impact on the hydrology, morphology, water quality, and biodiversity of urban streams (Table One). The quality of an urban stream depends on the interaction of many different physical and biological processes, each of which is strongly influenced by the degree of impervious cover in the contributing watershed.

Urban stream degradation is a classic example of the difficulty in addressing long-term environmental change at the local level. Development is a gradual process that spans decades and occurs over a wide region of the landscape. It is, however, composed of hundreds of individual development projects completed over a much shorter time-span, which transform just a few acres at a time. Consequently, the true scope of stream degradation may not be fully manifested at the watershed scale for many years. The challenge for local planners is that they must review and mitigate the impact of each individual development proposal over the long term within a watershed context.

The urban watershed protection approach outlined in this paper attempts to provide a coherent framework for effective environmental regulation at the local level throughout the development process. The approach focuses on the comprehensive protection of headwater stream quality throughout the entire development cycle.

Protecting Urban Watersheds

Communities have tried to deal with the complex range of impacts on streams by adopting an equally complex series of regulations and criteria to govern the development process. However, these measures have often been less effective than anticipated. A major reason for this failure has been the tendency to regulate a single impact at only one stage of development. Until recently, few communities have tried to craft a comprehensive stream protection strategy over the entire development cycle, from watershed-based zoning to its ultimate realization in the construction of individual development projects.

An effective watershed protection strategy uses eight tools in combination.

Tool 1-Watershed Planning

The future quality of an urban stream is fundamentally determined by the broad land-use decisions made by a community. It is therefore essential that the impact of future development on streams be seriously assessed during the zoning or master planning process. The most appropriate planning unit for this assessment is the watershed or sub-watershed. On the basis of a forecasted level of impervious cover, it is possible to devise effective and achievable strategies for stream protection.

The Center for Watershed Protection has recently developed a handbook to foster more rapid and effective watershed planning at the local level. (CWP, 1998a)

Tool 2-Land Conservation

The second watershed protection tool involves the adoption and enforcement of ordinances to prevent development from occurring in key natural areas such as streams, wetlands, flood plains, steep slopes, mature forests, critical habitat areas, and shorelines. These ordinances should describe how these sensitive areas will be delineated at each site and outline how they are to be protected during the site planning, construction, and post-construction stages. In addition, non-regulatory techniques for land conservation may also need to be employed. Some guidance on effective use of the land conservation tools can be found in CWP, 1998b.

Tool 3-Aquatic Buffers

To protect an urban watershed fully, it is necessary to establish a wide forested buffer adjacent to the stream channel, wetlands and shoreline. A buffer network can be regarded as the right-of-way for a stream, and is an integral element of the stream itself. A forested buffer provides shade, woody debris, leaf litter, streambank protection, pollutant removal, and a multitude of other functions and services to the stream. Guidance on how to design and manage stream buffers can be found in CWP, 1998b.

TABLE ONE

Summary of Impacts Associated With Urban Streams

Once watershed impervious cover exceeds 10 percent, recent research has shown that significant changes can be expected to occur in urban streams.

1. Higher flood peak discharge rates
2. More frequent bankfull flooding events each year
3. Lower stream flow during dry weather periods
4. Enlargement of the stream channel
5. Greater streambank erosion and channel incision
6. Increased length of modified stream channels
7. Reduced volume of large woody debris (LWD) found in stream
8. Loss of pool and riffle structure
9. Increased number of stream crossings, with greater potential to affect fish passage
10. Degradation of stream habitat structure
11. Decline in stream bed quality (imbedding, sediment deposition, turnover)
12. Fragmentation of the riparian forest corridor
13. Warmer stream temperatures
14. Greater loads of stormwater pollutants
15. Higher probability that coliform levels exceed recreational contact standards
16. Lower diversity of aquatic and freshwater mussels
17. Lower diversity of native fish species
18. Loss of sensitive fish species (trout, salmon, sculpins)
19. Lower spawning success of anadromous fish
20. Decline in wetland plant and animal diversity

Tool 4-Better Site Design

Individual development projects can be designed to reduce the amount of cover they create and increase the natural areas they can conserve. Less impervious cover translates into less stormwater runoff and lower pollutant loadings. Planners and landscape architects can utilize a wide range of site planning tools to minimize impervious cover. Some of these tools are summarized in Table Two. Many innovative site planning techniques have been shown to reduce sharply the impact of new development. (CWP, 1998c). Designers, however, are often not allowed to use these techniques because of outdated local zoning, parking, or subdivision codes.

Thus, the fourth watershed protection tool seeks to foster better site designs that can afford greater protection to a sub-watershed. To this end, it is important to analyze critically the existing subdivision codes and related development criteria. Nearly every community in America has a subdivision code that regulates the density and geometry of development, specifies road widths, parking and drainage requirements, and defines resource protection areas. In many communities, subdivision codes routinely exceed several hundred pages. Often known as the "cookbook," these lengthy codes contain a series of restrictive and uniform standards that govern all aspects of development and trigger a complex site planning process. These requirements virtually tie the hands of the architects, landscape architects or engineers involved in design and site planning for new developments. The Center for Watershed Protection has recently developed a handbook that helps watershed managers identify the local development rules that need to be changed to promote better site designs (CWP, 1998d).

Tool 5-Erosion and Sediment Control

Perhaps the single most destructive stage in the entire development process is the clearing of vegetative cover and the subsequent grading of the site to achieve a more buildable landscape. Trees and topsoil are removed, soils are exposed to erosion, steep slopes are cut, natural topography and drainage are altered, and sensitive areas are often disturbed.

Thus, the goal of the fifth watershed protection tool is to reduce the massive sediment pulse that inevitably occurs during the construction stage through a combination of clearing restrictions, erosion prevention and sediment controls. Traditionally, many communities have focused on enforcing erosion and sediment control plans at construction sites primarily through structural practices and temporary seeding. The value of non-structural practices for erosion control, such as clearing restrictions, construction sequencing, foot-printing and forest conservation, is increasingly recognized.

TABLE TWO

Strategies to Minimize Impervious Areas at the Site Level

1. Reduce residential road widths
2. Shorter road lengths
3. Cul-de-sac donuts
4. Disconnect roof leaders
5. Cluster development
6. Angled parking
7. Smaller parking stalls
8. Reduced parking ratios for some land uses
9. Shared parking and driveways
10. Shorter residential driveways
11. Reduced cul-de-sac radii
12. Taller buildings (with higher FAR ratios)
13. Vertical parking structures
14. Require open space/green space
15. Require buffers
16. Swales rather than curb/gutters
17. Encourage runoff onto pervious surfaces
18 Commercial open space landscaping
19. Sidewalks on one-side of street
20. Reduce setbacks and frontage
21. Flexible lot sizes
22. "Hourglass" streets
23. T or V shaped turn-arounds
24. Permeable spillover parking areas

Tool 6-Stormwater Best Management Practices (BMPs)

The sixth watershed protection tool involves the application of urban stormwater BMPs to treat the quality and quantity of runoff generated by impervious surfaces. Stormwater BMPs include ponds, wetlands, filters and infiltration and open channels that are designed to replicate redevelopment stream hydrology and water quality. While many recent advances have been made in stormwater BMP design, most can only partially mitigate the impacts of development on streams.

Stormwater BMPs are a simple structural solution to a complex problem, and cannot be expected to compensate for a lack of watershed planning, poor site design, or the absence of a stream buffer network. Indeed, poorly designed or located stormwater BMPs can create as many environmental problems as they are intended to solve. Stormwater BMPs require an ongoing commitment to maintenance to sustain their performance and longevity. Many communities have failed to recognize the long-term cost burden involving stormwater maintenance. A new design manual for stormwater BMPs has recently been devised by the state of Maryland that surmounts many of these problems (MDE, 1998).

Tool 7 - Address Non-stormwater Discharges

This tool concerns itself with how wastewater and other non-stormwater flows are treated and discharged in a watershed. Three basic kinds of non-stormwater discharges are possible in a watershed.

1) Septic Systems

2) Sanitary Sewer: Wastewater is collected in a central sewer pipe and sent to a municipal treatment plant. Ideally, this permits more efficient collection of wastewater, and often higher levels of pollutant reduction. The extension of sanitary sewer lines is not without some risk, as it has the potential to induce more growth than may have been possible in a watershed that had been previously served by on-site sewage disposal systems, particularly when soils are limiting. In addition, not all sanitary sewer systems are capable of achieving high levels of pollutant reduction. Examples include: package treatment plants; combined sewer overflows; sanitary sewer overflows; and illicit or illegal connection to the storm drain network.

3) Non-wastewater flows: Wastewater is not the only non-stormwater discharge possible in a watershed. A planner should also investigate whether other non-stormwater discharges are a factor in the sub-watershed. Examples include: industrial Nation Ppollutant Discharge Eelimination System (NPDES) discharges; urban "return flows"; water diversions; and runoff from confined animal feeding lots.

Most non-stormwater discharges are strictly governed under the NPDES and require a permit.

Tool 8-Watershed Stewardship Programs

The goal of this tool is to increase public understanding and awareness about watersheds, promote better stewardship of private lands, and develop funding to sustain watershed management efforts. Watershed managers should consider at least six basic programs to promote watershed stewardship:

1. Watershed Advocacy
2. Watershed Education
3. Pollution Prevention
4. Watershed Maintenance
5. Indicator Monitoring
6. Stream Restoration

A basic premise of watershed stewardship is that we must learn two things – that we live in a watershed and that we must know how to live within it. The design of watershed education programs that create this awareness is of fundamental importance.

A key element of watershed stewardship involves the inspection, maintenance and restoration of watershed protection "infrastructure" created by the first seven tools. This can involve the maintenance of stormwater BMPs, enforcement of buffers, or restoration of streams. This stage is often the weakest element of a watershed protection strategy, and one of the most important, as the watershed protection infrastructure must continue to function properly over many decades to achieve the desired level of stream quality.

Summary

The practice of watershed protection is simply about making choices about what tools to apply, and in what combination. The eight watershed protection tools roughly correspond to the stages of the development cycle from initial land use planning, site design and construction through ownership. As a result, a watershed manager will generally need to apply some form of all eight tools in every watershed to provide comprehensive watershed protection. The tools, however, are applied in different ways depending what category of sub-watershed is being protected. More detail on implementing each watershed protection tool is provided in The Practice of Watershed Protection (CWP, 1998b).

At first glance, many communities may feel that implementing the watershed protection tools may pose a daunting challenge. In an era of fiscal austerity, some communities may reasonably question whether they possess enough financial, staff and political resources to carry it off. While watershed protection does require a strong local commitment, it is primarily a management approach to organize existing staff resources and programs more efficiently around a common objective. The tools are not intended to produce more rules and regulations to govern development. Rather, they seek to reform and simplify existing ones, and substitute flexible performance criteria in the place of rigid and uniform standards. Lastly, it should be noted that the application of watershed protection tools can confer many economic benefits to a community (Schueler, 1996).

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Habitat Protection and Restoration and Bioengineering for Soil Erosion and Sedimentation Control

Moderator: Karen Holland, U.S. Environmental Protection Agency

Swan Creek Bioengineering Project
Stephen Kunselman, Sumpter Township, Michigan

Marketing Wetlands for Profit
Bernard Czartoski, Maumee Valley Resources Conservation and Development, Ohio

Fish Creek Project
Larry Clemens, Nature Conservancy, Indiana

Swan Creek Bioengineering Project

Stephen Kunselman, Sumpter Township, Michigan

Sumpter Township in Wayne County, Mich., in collaboration with the Wayne County Soil and Water Conservation District, University of Michigan, and Big Swan Creek Intercounty Drainage Board, received funding for the Swan Creek Bioengineering Project from the Great Lakes Basin Program for Soil Erosion and Sediment Control. This project analyzes the effectiveness of three bioengineering techniques to stabilize stream banks of dredged stream channels. The three bioengineering techniques used were live stakes, live fascines, and a vegetated (live) crib wall. Each was installed along a 25-yard minimum section of dredged stream channel with a similar area left untreated for comparison. They were each evaluated on their ability to stabilize vegetatively the stream bank to reduce sloughing and erosion. Ease of installation and cost-effectiveness were also analyzed.

The live stakes performed well; increased subsoil stability of the stream bank was accomplished following initial sprouting of approximately 60 percent of the live stakes. Although some rill and gully erosion occurred on the stream banks within both the installation area and control area, a greater amount of gully erosion occurred in the control area.

The live fascines failed to perform as designed due to inadequate slope preparation, inclement weather and poor installation procedures. Vegetative growth of the fascines amounted to approximately 50 percent of the fascine bundles one month after installation in the early spring; 10 percent of the fascines showed vegetative growth one year after installation. No live stakes were viable one year after installation.

The vegetated (live) crib wall was successful in stabilizing a severely eroded stream bank at the outside bend of the stream channel. Approximately 75 percent of the vegetative layers sprouted the first month after installation in the early spring; three months after installation approximately 75 percent of the vegetative layers were still viable. Approximately 60 percent of the live stakes used to secure the crib wall sprouted and remained viable three months after installation. Vegetative coverage (including willow, dogwood, and grass) of the project site was approximately 85 percent by mid-summer. In addition, there is no evidence of the crib wall being breached by stormwater since its installation; in fact, the opposite bank is eroding slightly now that the channel is hindered from eroding the outside bank.

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Marketing Wetlands for Profit

Bernard Czartoski, Maumee Valley Resource Conservation and Development, Ohio

Interfacing agricultural and ecological systems to help protect natural resources and sustain agricultural production is the challenge for the future. This innovative demonstration project was recently initiated to illustrate how construction and management of wetlands, coupled with sub-irrigation, can be economically profitable for farmers. The overall objective is to stimulate adoption of wetlands and to reduce adverse impacts of agricultural runoff. The project focus is to link constructed wetlands with water supply reservoirs for corn and soybean production using sub-irrigation. Wetlands are constructed on converted cropland to receive drainage from adjacent cropland, resulting in zero-discharge from those fields directly to streams. Agricultural runoff and subsurface drainage will recharge the constructed wetland seasonally. A deep water pool in the two-stage wetland serves as a supplemental water supply for sub-irrigating corn and soybean crops in adjacent fields. Sub-irrigation research conducted in Michigan and Ohio suggests a strong potential for northwestern Ohio, but water supply is often a limiting factor.

The demonstration project, expected to be completed in six years, was built on the need to enhance and properly utilize wetlands near agricultural land use areas where the success of sub-irrigation has a high potential. Cooperative efforts between Maumee Valley RC&D, USDA-Natural Resources Conservation Service, USDA-Agricultural Research Service, Ohio State University, Michigan State University and others will construct three to four wetland/reservoirs in the spring of 1995 to be linked with sub-irrigation systems, or retrofitted subsurface drainage systems during 1995. Technology transfer is a major component of the project, using tri-state sub-irrigation conferences and field days to teach farmers, technical and regulatory agency personnel, and non-agricultural citizens the benefits of interfacing wetlands with modern agricultural production.

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Note: This project is funded primarily through the U.S. EPA, Great Lakes Program Office and the Lake Erie Protection Fund. It is supported cooperatively by the USDA-Maumee Valley Resources Conservation and Development Area, Ohio Land Improvement Contractors Association, USDA-Natural Resource Conservation Service, USDA-Agricultural Research Service, The Ohio State University, and Michigan State University.

Fish Creek Project

Larry Clemens, Nature Conservancy, Indiana

Fish Creek, located in extreme northeastern Indiana and northwestern Ohio, occupies a 110 square mile agricultural watershed and drains part of the south-central region of the Great Lakes basin. Fish Creek is one of the best remaining examples of the unique conditions associated with the watershed. A diverse assemblage of aquatic species, characterized by both Ohio River Valley and Great Lakes community components, survives only in Fish Creek. Some 31 mussels and 43 fish species currently reside in Fish Creek. Three of the mussel species–the white cat's paw pearly mussel, the northern riffle shell, and the clubshell -- are federally endangered species. Fish Creek supports the last remaining population of the white cat's paw pearly mussel.

Mussels and their host fish are especially vulnerable to nonpoint source pollutants. Increased sedimentation to streams results in stream bed siltation, which may directly kill some organisms or indirectly reduce population levels by decreasing habitat suitability for other species. The removal of riparian vegetation also decreases in-stream habitat structure, reduces shade (which may increase peak summer water temperatures) and enhances stream bank erosion potential. The removal of native vegetation and wetlands also reduces groundwater recharge, which results in reduced baseflow conditions during periods of little or no rain. In addition, construction activities in or adjacent to the stream are a serious threat to localized mussel beds, and may result in direct habitat disruption or in greatly increased siltation/habitat degradation downstream.

Although Fish Creek has long been recognized as a high-quality creek, it was not until 1988, when a study of freshwater mussels was conducted, that it stood out as a gem. The study generated interest from both the Indiana and Ohio Departments of Natural Resources, U.S. Fish and Wildlife Service, and The Nature Conservancy. At that time, a partnership began to form to protect the creek's water quality. This core partnership realized that alone, they would not have the financial or technical expertise to begin protecting Fish Creek. New partnerships were formed with local soil and water conservation districts, the Natural Resources Conservation Service (formerly the Soil Conservation Service), Purdue University, county surveyors, and others. Each partner brought to the group different goals and agendas, but all the partners were focused on one mission: maintaining and improving the water quality of Fish Creek to create a sustainable ecosystem.

It became apparent that to succeed, the partners needed a local presence to begin working with local citizens. In 1992, The Nature Conservancy hired a project manager and a project office was established using a Section 319 grant. At that time, a local advisory group was formed, using local citizens and project partners. The advisory group's role was to develop protection strategies and be local advocates for the project. This group worked with the project manager to develop reforestation and conservation tillage programs. The advisory group helped the project partners overcome obstacles with the local community, such as concerns over regulations involving endangered species, property rights issues, and distrust of government and environmental organizations.

The local advisory group members became representatives for the project at local churches, coffee shops, and events involving the local citizens. The advisory group was just one component of the partners' strategy to work in the community. The other focus was on meeting landowners one-on-one on their farms and other properties. This work was completed by the project manager. The goals were to develop relationships with individuals, become familiar with the landscape, and identify potential protection projects with the landowners. During a six-month period, nearly all landowners with land next to Fish Creek in the lower 15

miles were contacted. These contacts have proven to be the foundation of the work completed at Fish Creek.

Local citizen involvement in program development and implementation allowed the group to accomplish the following:

- Reforest 546 acres;
- Assist farmers in the purchase of 25 pieces of conservation tillage equipment, involving more than 6,000 acres and saving more than 30,000 tons of soil annually;
- Restore 25 acres of wetlands;
- Exclude livestock from the creek;
- Acquire 466 acres of old growth forest, farmland and corridor;
- Assist the only wastewater treatment plant in the watershed to convert from a chlorine-based system to an ultraviolet light system;
- Assist four local fire departments to purchase emergency response equipment; and
- Seed six acres of critical area to permanent vegetation.

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MONITORING AND INDICATORS FOR SOIL EROSION AND SEDIMENTATION

Moderator: Dan Bauer, U.S. Geological Survey, Illinois

Sediment Discharge in the Maumee River Basin and Implications for Agricultural Land Management in Ohio, Michigan and Indiana
Donna Myers, U.S. Geological Survey, Ohio

Characteristics of Suspended Sediments in the Maumee River
Peter Richards, Heidelberg College, Ohio

Use of Volunteers on the Boardman River
Steve Largent, Grand Traverse Conservation District, Michigan

Sediment Discharge in the Maumee River Basin and Implications for Agricultural Land Management in Ohio, Michigan, and Indiana

Donna Myers, U.S. Geological Survey

The Maumee River is the largest tributary source of suspended sediment discharge into Lake Erie. Crop land in the basin is the largest contributor to sediment discharge. Conservation tillage was used by farmers from 1994 to 1998 on about 50 percent of all corn and soybean fields. This study was done to identify the major source areas of suspended sediment discharge and determine if conservation tillage can be related to reductions in sediment discharge from streams in the basin. A suspended sediment budget for 1997 showed the Auglaize River, which drains clayey soils from 35 percent of the Maumee River basin, contributed 35 percent of the suspended sediment discharge. Only six percent of the suspended sediment discharge came from the Tiffin and St. Joseph rivers, which drain silty to sandy soils from 28 percent of the Maumee River basin. Although no trend in annual mean stream flow was detected, a 53 percent down trend in suspended sediment discharge was detected for the Auglaize River near Ft. Jennings, Ohio, for the periods 1970-74 compared to 1996-98. These findings provide important information on the success of conservation tillage and can help direct these activities to areas with the highest sediment discharge rates.

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Characteristics of Suspended Sediment in the Maumee River

Peter Richards, Heidelberg College, Ohio

The Water Quality Laboratory has been monitoring suspended sediment and nutrients in the Maumee River at Bowling Green since 1975, taking 3 to 4 samples per day during runoff events and daily samples during lower flow conditions. In this time, we have gathered information from nearly 10,000 samples. This program documents many aspects of the behavior of suspended sediment in this largest tributary of Lake Erie.

Lake Erie receives the highest sediment load from its tributaries of all the Great Lakes. The Maumee River contributes the greatest share of this load. Over the period of record, the Maumee at Bowling Green has averaged 1,270,000 tons of sediment annually. This sediment is important as a pollutant in its own right, but also carries other materials, such as phosphorus and metals. Most of the sediment is transported during storm runoff periods. Typically, sediment concentrations increase as flow increases, but the sediment concentrations peak before the flow does, and decrease faster than the flow. Sediment concentrations are particularly high in runoff from storms with sudden onset of intense rainfall, and at times of year when crop cover is absent from fields. Over the course of a typical year, most of the sediment is transported by the two or three largest storms. In the Maumee, about 95 percent of the sediment load is transported on the five percent of the days with the highest daily loads, and nearly all of the sediment load is transported on the 10 percent of the days with the highest daily loads.

Even on an annual basis, sediment concentrations and loads are highly variable, due entirely to year-to-year differences in the frequency and timing of storms and their interaction with the landscape. The average of the three smallest annual loads during the study period is 449,000 tons, while that for the three largest is 2,056,000 tons. Increases in conservation tillage and other agricultural management practices, together with measures to reduce nonpoint pollution from other sources, have led to reductions in concentrations and loads of sediment that are statistically significant in spite of the great variability that characterizes sediment transport. The decrease in the Maumee River is about 20 percent over the 20 year period from 1975 to 1995. While this is a substantial decrease, it is modest compared to the recently-announced target of a further 67 percent reduction in sediment loads to Lake Erie, most of which will have to be met by reductions in Maumee sediment loads.

Recent studies of particle sizes of Maumee River suspended sediment show that it is composed almost entirely of very small particles, most of them in the clay size range. This finding has several implications. Because of the ease with which fine particles can be transported in flowing water, it will be more difficult to control the loss of sediment from the landscape than would be the case with coarser sediment. On the other hand, fine sediment can travel great distances during a single storm, so not much of it will be deposited in the river at the end of the runoff period. Consequently, most of the sediment in transport at any one time is likely to be newly eroded from the land, and any management practices that lead to reduced erosion should show their benefits in a relatively short period of time. Fine particles also absorb many chemicals and nutrients, such as phosphorus, more effectively than coarser ones, so the sediment in the Maumee River is a particularly effective agent in the movement of other pollutants. Controlling sediment means controlling chemical nutrients as well.

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Use of Volunteers on the Boardman River

Steve Largent, Grand Traverse Conservation District, Michigan

The Boardman River is a state of Michigan-designated Natural River and "Blue Ribbon" trout stream. It is considered one of the top 10 trout streams in Michigan. The Boardman River watershed is located in northern Michigan's Grand Traverse and Kalkaska counties and drains approximately 295 square miles of land through 130 miles of rivers and stream tributaries. Flowing into Grand Traverse Bay at Traverse City, the river is the largest tributary to the west arm of the bay. The protection of Grand Traverse Bay is the focus of the broad-based and internationally recognized Grand Traverse Bay Watershed Initiative. A 1991 erosion inventory revealed over 600 streambanks erosion sites that were contributing sand to the river system. Eighty-five percent of the erosion sites are the result of human activity.

In 1993, the Boardman River Restoration and Protection Project received a three-year state Section 319 grant to conduct restoration on approximately 60 sites. That grant was stretched into a fourth year after which 84 sites had been restored and four sand traps installed. The project used state prison labor to restore erosion sites on public land, while volunteers were used on sites located on private land. In addition, the two county road commissions in the watershed restored six road/stream crossings.

Volunteers were also engaged on a limited basis to conduct monitoring. Using Michigan Department of Natural Resources Procedure 51, aquatic insect diversity and stream habitat conditions are measured annually at 13 Index Stations located throughout the watershed. The use of volunteers to conduct monitoring has its limitations due to the fluctuation in participation. To conduct Procedure 51 properly and generate usable data, training and consistency are critical. In the future, the project will use volunteers to conduct stream cross-sections where the data generated is less subjective.

In conclusion, it has been our experience that the best use of volunteers is for streambank restoration activities rather than for monitoring purposes. Restoration work enables volunteers to learn about the river with comparatively little time invested in training. The work is interesting and gives them a sense of ownership.

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Soil Erosion and Sediment Control in an Urban Environment

Moderator: Maurine Orndorff, National Association of Conservation Districts - Great Lakes Committee

NPDES Stormwater Permit Programs
Peter Swenson, U.S. Environmental Protection Agency

BMP Workshop–Streambank Erosion in Urban Environments
Paul Novak, U.S. Environmental Protection Agency

The Countryside Program–Promoting Balanced Approaches to Open Space Conservation and Development in Rural Areas of Northeast Ohio
Kirby Date, coordinator of the Countryside Program and
Keith McClintock, Geauga Soil and Water Conservation District

Construction Site Erosion Control/BMPs on Construction Sites
Jim Storer, U.S. Department of Agriculture -Natural Resources Conservation Service

Soil Erosion and Sediment Control under the NPDES Storm Water Permit Program

Peter Swenson, U.S. Environmental Protection Agency

Under the Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES) permits are required in order to discharge storm water associated with industrial activity. U.S. EPA defines construction activities disturbing five or more acres to be industrial activity requiring storm water permits under the NPDES program. The U.S. EPA and states have relied on general permits to address the large number of construction sites that need to be regulated. Various mechanisms have been developed to help assure that these permits are being complied with.

The U.S. EPA is currently developing new Phase II requirements to address additional sources of storm water under the CWA. Proposed to be added are requirements for permits for construction sites as small as one acre, with a number of possible waivers. Municipalities in urbanized areas are also expected to develop and operate erosion and sediment control programs where these are lacking. The final Phase II regulations are expected to be finalized in the spring of 1999.

Visit U.S. EPA's web site at: www.epa.gov/owm/stormw.htm

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BMP Workshop–Streambank Erosion in Urban Environments

Paul Novak, U.S. Environmental Protection Agency

A series of courses on urban stream restoration using bioengineering techniques came about as a result of several agencies finding a lack of local knowledge in the field regarding bioengineering techniques. Although several one to two day short courses had been held in the northeast Ohio region, none seemed to be targeted specifically at those individuals or organizations that might actually be called upon to design, build or oversee the construction of urban stream restoration projects. The goal was to put on a series of short courses that would cover the many aspects of successful urban stream restoration and target the desired audiences.

In January 1998, Jim Storer of the Natural Resources Conservation Service office in Cuyahoga County, Ohio, and I met to discuss the lack of local capacity in the area of urban stream restoration. We then convened a workgroup to deal with this issue. The workgroup included staff members from various agencies that included the Geauga Soil and Water Conservation District, Northeast Ohio Regional Sewer District, Cuyahoga River Community Planning Organization, Northeast Ohio Areawide Coordinating Agency and the Cuyahoga Soil and Water Conservation District.

With this wide array of supporting agencies, I was able to approach the U. S. EPA's Great Lakes National Program Office for funding. Several of the agencies also contributed funding to the effort. Those agencies that were unable to contribute funding provided staff time and materials.

Early discussions within the workgroup led to the decision to offer four courses. The first course was a general information session giving an overall scope to urban stream restoration. We intended this course to be attended by members of our target audience but also the general public. The second course was designed as an "invitation only" offering. This course was offered to instruct attendees in stream assessment. The third course was also an "invitation only" offering. It was designed to deal with the actual elements of designing a successful urban restoration project. The last course was offered only a participants of the second and third courses. It was a follow-up course to enable the students to put what they learned into practice in the field.

The benefits to the community were several. First, we were able to build design capacity in the local community. Second, we were able to secure some assurance that if urban stream restoration projects were, they would be done correctly with a greater chance of success. Finally, each of the participating agencies were able to participate in a planning effort on a new level, and demonstrate a leveraging of their efforts for benefit of the community and the environment.

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The Countryside Program–Promoting Balanced Approaches to Open Space Conservation and Development in Rural Areas of Northeast Ohio

Kirby Date, Coordinator of the Countryside Program and
Keith McClintock, Geauga SWCD/Western Reserve RC&D, Ohio

As rural communities experience growth, many seek balanced ways to allow for economic development while conserving important resources that may be lost if development occurs conventionally. Many tools exist for land preservation in rural areas, ranging from outright purchase of land to conservation easements to Conservation Development. Conservation Development refers to residential and commercial development that is designed and planned flexibly to conserve resources. Conservation Development has three important components: up-front community vision and planning, effective zoning codes, and good development projects. Implementation of this approach benefits the community, environment, property owners, developers and new residents, resulting in a "win-win" situation for all involved while conserving important land, views, historic structures, habitat and "rural character" in the process.

The Countryside Program is a unique project serving a nine county area of Northeast Ohio to promote Conservation Development. Through education, technical assistance and information/referral, supported by thorough research and a sound legal/planning approach, rural communities, developers and property owners are encouraged to plan ahead to conserve important resources while allowing development to occur. The program has met with success in its two years due to its status as an independent, privately funded third party, its association with soil and water conservation districts, and its fostering of a spirit of cooperation between developers and communities. The project is supported by the George Gund Foundation, Cleveland Foundation, GAR Foundation, and Nord Family Foundation of Northeast Ohio.

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Construction Site Erosion Control/BMPs on Construction Sites

James Storer, USDA-NRCS

The Cuyahoga Soil and Water Conservation District (SWCD) undertook a two-year education and research program to demonstrate and evaluate the proper and timely application of temporary seeding and mulch on active construction sites. The Cuyahoga SWCD handled all aspects of the grant except for the research component. The research objective was handled by Dr. Jonathan Harbor, then at Kent State University and now at Purdue University, and Kent State University graduate student John Snyder.

We demonstrated the proper and timely application of temporary straw and seed application by actually doing that work ourselves on two demonstration sites. We did this independently of the other construction activities taking place and other contractors working on the site. In effect, the Cuyahoga SWCD set up its own temporary seeding contracting operation. Dr. Harbor and his graduate student concurrently evaluated this approach in which temporary vegetative soil stabilization was applied rapidly and frequently to all bare areas on a construction site. Using field sampling of runoff from untreated and treated sites, as well as computer modeling based on site condition maps, we found that rapid application of surface cover dramatically reduced both the amount of sediment generated by surface erosion, and the concentration and total load of phosphorus in storm water runoff. Rapid applications of surface cover reduced soil erosion by up to 86 percent and phosphorus loadings by up to 80 percent compared to bare soil conditions. Developers also recognized the advantage of extensive green areas in marketing home lots and could significantly reduce nonpoint source pollution in the form of both phosphorus and sediment.

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Keeping it on the Land: Agricultural Practices for Erosion Control

***Moderator**:* John Kohl, Chair, National Association of Conservation Districts - Great Lakes Committee

Trends in No-Till Agricultural Practices and Strip-Till Equipment Lease Program/Heavy Residue Management System
James Rickenberg, Water Quality Coordinator, USDA-NRCS

Reduced Erosion Through Sustainable Agricultural Practices
Russ LaRowe, Michigan Agricultural Stewardship Association

Trends in No-Till Agricultural Practices and Strip-Till Equipment Lease Program/Heavy Residue Management System

James Rickenberg, Water Quality Coordinator, USDA-NRCS

Conservation tillage, leaving 30 percent residue cover on the soil surface at planting, started slowly in the early 1980s in northwest Ohio. Initially, its success centered on its time savings, lower input costs, increased wildlife and minor interest in the soil savings aspects. Negative aspects were related to weed control and the availability of no-till planters.

Ultimately, no-till's effect on agriculture has been significant. No-till corn is still a major concern with many tracking conservation tillage progress. Many farmers report that corn is a sensitive crop that can, in some cases, do well with no-till or, in other cases, be a total disaster. Understanding how and why this happens is a mystery to most. As a result, there is a trend from no-till to light or conventional tillage for corn. No-till soybeans have been a tremendous success. This past year there was an 11 percent gain statewide in this area. Improvements in drills and weed control, especially Roundup Ready™ seed, offer farmers tremendous possibilities.

The Wood Soil and Water Conservation District has applied for two separate grants under the Great Lakes Basin Program for Soil Erosion and Sediment Control. One is titled *Heavy Residue Management System* and one titled *Strip-Till Equipment Lease Program: Reducing Soil and Nutrient Runoff.* These programs are being tested and utilized by area producers, educational groups and researchers.

Both of these programs were designed to demonstrate to the local producers that there are other methods of contending with crop residues than no-tilling or conventional tilling. The Heavy Residue Management System used a series of coulters to till and mix the soil in a six-to-eight inch band. This system can be used in the fall or spring, or both. The strip-tillage equipment utilizes a coulter, row-cleaners, knife and covering disks to till an eight-to-ten inch wide area and create a four-to-seven inch high mound. I can also deep place fertilizers if the operator so desires. The strip-tillage equipment at this point is operated best in the fall.

The implications of conservation tillage adoption have been seen in improved water quality in Lake Erie. Phosphorus levels have decreased dramatically. Sediment levels reaching Lake Erie have also been reduced.

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Reduced Erosion Through Sustainable Agricultural Practices

Russ LaRowe, Michigan Agricultural Stewardship Association

The Michigan Agricultural Stewardship Association (MASA) is a farmer education organization that uses a system of on-farm research to demonstrate sustainable agricultural practices. Many types of tillage systems have been developed for agriculture that significantly reduce soil erosion by keeping the soil covered during the most vulnerable times of the year – the non-growing season.

Working closely with Michigan State University, MASA farmers have used extensive cover crop systems to keep viable, living plants and roots active during the entire year. This activity has proven to be an exceptional way of improving soil tillage and water infiltration rates, thereby reducing surface water erosion.

Other practices that result in increased infiltration include the adoption of rotational grazing systems for livestock operations, the use of compost (both manure and plant materials), and an increase in crop rotation. All of these practices have proven to be, directly or indirectly, responsible for improved soil quality and reduced soil erosion in field experiments.

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Buffer Strips and Streambank Management for Livestock Operations

Moderator: Jon Bartholic, Institute of Water Research,
Michigan State University

Lake Erie Buffer Strip Initiative
Steve Davis: U.S. Department of Agriculture-Natural Resources
Consevation Service

Streambank Stabilization "Erosion Runoff" Control Project
Dona Hunter, Coordinator,LaGrange Soil and Water Conservation District, Indiana

Grazing/Water Supply Erosion Control Project
Harvey Pinkerton, Penn Soil Resource Conservation and Development, Pennsylvania

Lake Erie Buffer Strip Initiative

Steve Davis, USDA-NRCS

The national Conservation Buffer Initiative contains a goal of installing 2,000,000 miles of conservation buffers by the year 2002! Conservation buffers include conservation practices such as filter strips, riparian forest buffers, grass waterways, field windbreak, and wetland restorations. Buffers provide water quality and soil erosion benefits including sediment reduction, pesticide reduction, nutrient reduction, and fish and wildlife benefits.

Widespread installation of comprehensive buffer systems offers the potential to improve substantially the water quality of Lake Erie and its tributaries and significantly reduce the rate of sedimentation to Toledo Harbor. In order to advance the rate of adoption of conservation buffers within the Lake Erie Watershed, the USDA-Natural Resources Conservation Service and the Ohio Lake Erie Office joined forces to organize a Lake Erie Conservation Buffer Team. The Conservation Buffer Team membership includes a wide variety of public and private conservation partners.

This presentation examined what conservation buffers are, how they function, their benefits and how the Lake Erie Conservation Buffer Team is working as a partnership to promote adoption of the buffer systems. Special emphasis was placed on the potential contribution of buffers to reduce sedimentation in the Toledo Harbor, including a technical analysis which attempts to quantify the magnitude of the sediment reduction.

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Streambank Stabilization "Erosion Runoff" Control Project

Dona Hunter, Coordinator, LaGrange SWCD

La Grange County has several miles of perennial streams that outlet into a series of natural lakes. The water from these streams runs west toward the St. Joseph River and ultimately ends up in Lake Michigan. A survey conducted before the project began indicated that more than half of the landowners in this region of the county allow their livestock unlimited and continuous access to an open ditch or stream.

The ultimate goal of this project was to reduce severe streambank erosion and sedimentation from feedlot and pasture land sites along the streams and ditches within the St. Joseph River watershed. Our goal was to inform, educate and demonstrate to non-traditional land users (i.e., Amish) the economic and water quality importance of limiting livestock access to streams and ditches. A successful program would result in the reduction of streambank erosion and sedimentation.

A stream biologist carried out water quality tests before and after the project was completed, taking both chemical and biological samples. Stream quality demonstrated a statistical improvement at all feedlot and pasture locations where livestock had been excluded. Improvements in water quality outweighed the cost of fencing and developing alternative watering sources.

As a result of this initial project, which involved three landowners, additional funding was secured through the USDA Environmental Quality Incentives Program. We have been able to work with more landowners in the watershed and have seen an attendant improvement in water quality. As an outreach effort of this project, the SWCD has hosted a series of pasture walks, where participants discussed such issues as pasture management, rotational grazing, alternative watering sources, and the impact of these changes on water quality. An ongoing result is the willingness of participating Amish landowners to share their experiences with others in their community and to correct some of the problems they experienced on their own farms. In LaGrange County, working with the Amish community is an important priority that is becoming easier as word about the Soil and Water Conservation District program spreads among them.

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Grazing/Water Supply Erosion Control Project

Harvey Pinkerton, Penn Soil Resource Conservation and Development , Pennsylvania

Erie and Crawford counties contain all of Pennsylvania's contributing watershed to Lake Erie. Controlling access to streams with fencing and stream crossings does provide an effective means for controlling streambank erosion. However, this does not solve the age-old problem of providing water. Solving the problems of providing water to livestock goes hand-in-hand with limiting stream access. The stream may be the only source of water available for the livestock. Thus, the solution often is to move the water from the stream to the livestock.

The topography of the Pennsylvania Lake Erie basin is relatively flat and does not lend itself well to the use of hydraulic rams in remote locations. However, revolutionary changes are taking place in how water is being pumped to remote locations. Solar power can be used to generate electricity to pump water. Solar-powered water systems are practical in flat terrain. Solar-powered water pumps can be placed in or next to streams, ponds or other water sources and the water can be pumped to where it is needed. It can provide adequate water for any size herd, takes very little maintenance, has a very long life span (20-40 years), and never runs out of fuel as long as the sun continues to shine. Not only can a solar pump provide water in great quantity, it can deliver water away from environmentally sensitive areas, providing erosion and sedimentation control. By distributing water to all portions of pastures and grazing lands, forage quality will improve, benefitting herd health and increasing productivity.

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Keynote address

The Land-Use/Water Quality Connection and the IJC's Role Under the Great Lakes Water Quality Agreement

Thomas P. Behlen, Director, Great Lakes Regional Office, International Joint Commission

Our two countries share the longest unprotected boundary in the world – 8,890 kilometers or 5,525 miles of common boundary. Canada and the United States also share the largest system of fresh surface water on earth, the Great Lakes. In this region alone, 24 million people obtain their drinking water from the lakes. More ships pass through the locks at Sault Ste. Marie each year to transport goods out of and into the region than through the Suez and Panama canals combined.

But what happens when there is a disagreement on the use of the resource? For example, let's assume a lake with a dam at one end. Along the lake you have various landowners who like low water and large beach areas for recreation, while others need high water for navigation. Down the center runs an international boundary. How do you remedy the dispute?

The Boundary Waters Treaty, signed on January 11, 1909 by the U.S. and Great Britain, deals with this issue. The *first* principle is that projects affecting the level or flow of boundary waters require binational approval. The *second* states that boundary waters and water flowing across the boundary shall not be polluted on either side to the injury of health or property on the other. You will note that the treaty does not say that pollution will be abated when it is cost-effective to do so. It simply states that there will be no pollution that results in injury. The International Joint Commission was created under the Treaty. The Commission is composed of six members, three appointed by the government of Canada and three by the U.S. President, with the advice and consent of the Senate. Under the treaty, no use, diversion or obstruction of boundary waters affecting the level or flow on the other side shall be made unless approved by the International Joint Commission, or by special agreement between the two national governments. Approval by the Commission or by special agreement is also needed when a dam in the downstream country would raise the level on the other side. The IJC has orders concerning the operation of approximately 15 dams, eight hydroelectric powerhouses, one control structure, three international water apportionments, and seven ice booms. The governments have given references to IJC to research the sources and effects of common air pollutants, such as sulfur dioxide and particulate matter, and hazardous air pollutants along the boundary with an emphasis on the Detroit-Windsor and Port Huron-Sarnia region of southern Ontario and southeastern Michigan.

In 1972, the two governments added major additional responsibilities to the Commission through the **Great Lakes Water Quality Agreement**. The Commission has the role of advising the governments on their mutual progress under the Agreement. The purpose of the Agreement is to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem. In order to achieve this purpose, the parties agree to make a maximum effort to develop programs, practices and technology necessary for a better understanding of the Great Lakes Basin Ecosystem and to eliminate or reduce, to the maximum extent practicable, the discharge of pollutants into the Great Lakes system. Consistent with the provisions of this Agreement, it is the policy of the parties that:

(a) The discharge of toxic substances in toxic amounts be prohibited and the discharge of any or all persistent toxic substances be virtually eliminated;

(b) Financial assistance to construct publicly owned waste treatment works be provided by a combination of local, state, provincial, and federal participation; and
(c) Coordinated planning processes and best management practices be developed and implemented by the respective jurisdictions to ensure adequate control of all sources of pollutants.

The Agreement explicitly reaffirms the principle of not permitting injury through pollution established by the Boundary Waters Treaty. Of particular interest to you is Annex 13 of the Agreement, "Pollution from Nonpoint Sources." This annex delineates programs and measures for the abatement and reduction on nonpoint sources of pollution from land-use activities. These include efforts to reduce further nonpoint source inputs of phosphorus, sediments, toxic substances and microbiological contaminants contained in drainage from urban and rural land, including waste disposal sites, in the Great Lakes system.

The Ninth Biennial Report (1998) looked at the rural aspects of this annex. Agricultural land use accounts for 35 percent of the land area of the Great Lakes basin and dominates the southern portion of the basin. Agricultural lands serve as a major source of sediment and nutrients to the lakes. Agriculture is a major user of pesticides, with 26,000 tons used annually in the basin. Row-crop herbicides comprise the highest use chemicals by weight. As a result, the more persistent herbicides currently in use are present in the surface and ground waters of the basin. For 1993, it was estimated that 478 tons of atrazine were present in the Great Lakes.

The Commission has found that agricultural practices such as buffer strips and conservation tillage are cost-effective ways to reduce nonpoint contaminant loads to water bodies. Field studies have demonstrated the environmental benefits and cost-sharing initiatives have enhanced adoption by the agricultural community. The success of those who adopted innovative practices early on has helped promote broader acceptance. More widespread application of innovative measures, such as buffer strips to reduce herbicide delivery to water bodies, and global positioning to increase the accuracy of delivery to specific areas in fields, could reduce loadings by more than 50 percent. While practices such as conservation tillage have been widely accepted over the past 15 years, others that are more capital-intensive are considered and adopted much more slowly. Cooperative partnerships among government agencies, researchers, agricultural chemical companies and the farming community would greatly facilitate promotion and adoption of innovative practices. The Commission found a need for enhanced communication among these sectors and a requirement to display the leadership necessary to establish effective partnerships. Annex 13 of the Agreement also requires the parties to report biennially on progress in developing specific watershed management plans and implementing programs and measures to control nonpoint sources of pollution.

Among the agricultural and land-use programs in the Great Lakes basin, the Commission acknowledges the work of the Great Lakes Commission (GLC) to develop an agricultural profile of the basin; the U.S. Environmental Protection Agency's *1991 Pesticides and Ground Water Strategy*; the continued U.S. EPA-USDA promotion of conservation tillage; the joint GLC-U.S. EPA-USDA grant program to control erosion and demonstrate innovative conservation practices; and the *1998 U.S. Clean Water Action Plan: Restoring and Protecting America's Waters*, which sets nationwide goals for conservation buffers.

In the Ninth Biennial Report, the Commission recommended that governments adopt the following agricultural and land-use goals and targets:

- to place at least 55 percent of the Great Lakes basin row-crop acreage into conservation tillage by 2002;
- to increase buffer-strip mileage in the Great Lakes basin by at least 30 percent by 2002; and,
- to reduce herbicide loads to the Great Lakes by at least 30 percent by 2005.

The row-crop acreage would be calculated on an annual basis, and the buffer-strip mileage and herbicide loads would use 1998 as the base year. Assuming continued implementation of the initiatives identified above, the Commission believes that the targets and dates are achievable. The Commission requested that the status of the Parties' agricultural and land-use planning programs and progress to achieve the targets constitute part of their 1999 report of programs and progress under the Agreement. There are various examples around the basin, many of which you are hearing about in this symposium:

- ***A "Buy-Down" Program for Farmers to Purchase Conservation Tillage Equipment:*** A $641,000 U.S. federal grant for nonpoint source pollution abatement was used in 1992 to encourage conservation tillage. The Maumee RAP Agricultural Runoff Action Group collaborated with the Ohio Environmental Protection Agency, Ohio Department of Natural Resources and 17 Soil and Water Conservation Districts in the program, which provided farmers with "buy-down" money to be applied toward the purchase of conservation tillage equipment. More than 400 participants received money from this highly successful program, with farmers matching funds at a rate of nearly nine to one.

- ***Stormwater Workshop for Municipal Officials throughout the Maumee AOC:*** In November 1993, a $10,000 U.S. federal nonpoint source grant enabled the Urban Runoff Action Group to organize a workshop for municipal officials dealing with issues such as lawn chemicals, yard waste, household hazardous waste and construction site runoff. This well-attended workshop also served to educate participants about the Maumee RAP and how municipalities can be a part of the RAP process.

- ***Maumee Bay Sediment Reduction Project:*** During 1996 and 1997, the Natural Resources Conservation Service received $700,000 from the U.S. Army Corps of Engineers to conduct an extensive soil conservation program. The goal of this program is to prevent agricultural sediment runoff, thus reducing the dredging needs in Toledo Harbor. These funds are being divided and used differently among counties throughout the Maumee River basin to assist farmers in reducing erosion.

- ***Strip-Till Equipment Lease Program: Reducing Soil and Nutrient Runoff:*** This project is sponsored by the Maumee Agricultural Runoff Action Group. It promotes strip-till farming as a BMP to local farmers who are experiencing corn yield reductions when planting into wheat stubble. Strip-till equipment will be leased to the Wood Soil and Water Conservation District for two years. It will be used for several public demonstrations and to assist farmers. The project is being funded through a sediment reduction grant from the Great Lakes Commission and will be in effect from the fall of 1997 through the fall of 1999.

- ***The Bay of Quinte Area of Concern:*** Nearly 16,000 hectares of farmland have been converted from conventional to conservation tillage, and phosphorus inputs from rural sources has been lowered by 6,000 kilograms annually. Within the Bay of Quinte, phosphorus concentrations are approaching the Bay of Quinte RAP target of 30-40 grams per liter. The Bay of Quinte RAP determined that reducing phosphorus loadings from tributaries is the most cost-effective way of reducing phosphorus loading to the Bay. To achieve RAP restoration targets, a 10 percent reduction in tributary phosphorus loadings (25 percent of agricultural loadings) is being sought. This will be achieved if 30 percent (70,000 ha) of the Bay of Quinte basin's crop land is converted from conventional to conservation tillage.

- ***Severn Tributary Rehabilitation Project:*** The Tributary Rehabilitation Program continues on all tributaries to Severn Sound. This project involves clean-up of stream beds, stabilizing banks, fencing to restrict livestock access, volunteer tree planting, and the monitoring of sites after projects have been implemented. Approximately half of the stream length in the water-

shed, known to have cattle access, still needs remediation. Eight projects were completed in 1996, bringing the total for the program to 75. To date, fencing projects have restricted 2700 livestock from direct access to streams and 260 hectares of valley lands have been retired from farming and planted with trees and shrubs. The livestock restriction and changes in land use from pasture to forest in the retired valley lands represents a potential phosphorus reduction of 500 kilograms per year to Severn Sound streams.

- ***Natural Shorelines in Severn Sound:*** In 1996, the Natural Shorelines project addressed the restoration of natural shoreline vegetation in Penetanguishene. Restoring a buffer zone of natural vegetation on shoreline properties will directly reduce nutrient, sediment and pesticide export to Severn Sound, as well as provide wildlife habitat. The project provided a ready window of advice, assistance and materials for restoring shoreline in Severn Sound. Products included: creation of a public education package on the importance of natural vegetation, environmentally sound maintenance practices (reducing water, fertilizer and pesticide use), and shoreline rehabilitation; distribution of public information packages to all private, commercial and municipal shoreline property owners to enhance awareness of water quality and habitat issues; establishment of local sources of native trees and shrubs to be used for naturalization of shoreline property; and naturalization of over 10 percent of Penetang Bay shoreline property (approximately 1. 5 km). Three thousand trees and shrubs were planted. More than 100 volunteers were involved in the project.

- ***Rural Nonpoint Source Control Project:*** The Severn Sound Rural Nonpoint Source Control program was initiated. The project reduces pollutant loading to Severn Sound watersheds by evaluating farms to develop specific plans for reducing the loadings to area streams. Technical advice and funding assistance is available for septic systems, eaves troughing, manure and milk house waste management systems and conservation tillage. In 1996 and 1997, the program approved 16 projects. Potential sites for remediation projects, as identified in the Severn Sound RAP Stage 2, include approximately 100 livestock access restriction projects, 100 manure management projects, 8 milk house wash water treatment projects, and 120 private septic system upgrades.

The International Joint Commission, through its Great Lakes Water Quality Agreement boards, is continuing to look at these nonpoint source issues. In conjunction with this conference, the IJC Great Lakes Science Advisory Board hosted a forum to look at where have we come in the basin since the Pollution From Land Use Activities Reference Group (PLUARG) 20 years ago. Issues concerning pathogens, build up of phosphorus in soils and the growth and impacts of Confined Animal Feeding Operations (CAFO) were front and center in these discussions, along with the problem of a lack of adequate monitoring and assessment.

On October 8, in Lorain, Ohio, the Great Lakes Water Quality Board will be holding a symposium in conjunction with the Black River RAP entitled "Protecting What's Been Gained in the Black River," which will include breakout sessions on roles of stakeholders including homeowners, riparian land owners and agriculture in protecting the river.

The Great Lakes are the largest system of fresh surface water on earth, containing roughly 18 percent of the world supply. Only the polar icecaps contain more fresh water. This quantity of fresh water entrusted to us who make Canada and the United States home is virtually unparalleled anywhere on this earth. But even this abundance of water is deceptively fragile. Lake Superior — the largest freshwater lake by surface in the world — holds 2,900 cubic miles of water, enough to fill all of the other Great Lakes, plus three more of Lake Erie. The replacement time, or the time it takes for this amount of water to move through Lake Superior, is about 190 years. This means that many contaminants entering the lake are destined to stay there for a long time.

I want to thank the GLC and others who have organized this seminar for providing this forum and commend you for taking the time to participate. I strongly want to encourage you to take back to your communities what you have learned and use the information in your own programs, but also to share it with others. Through all of our efforts we will be able to restore and protect the shared waters of the Great Lakes in the best interests of the citizens of both our countries.

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Minimizing Dredging Costs Through Prevention of Soil Erosion and Sedimentation

Moderator: Jim Bredin, Michigan Department of Environmental Quality

Development of a Sedimentation Model for a Proposed Sediment Trap in Trail Creek, Indiana

Ajit Vaidya, U.S. Army Corps of Engineers

NRCS Sedimentation/Dredging Study in the Maumee River Basin: Toledo Harbor Sediment Reduction Project

Steve Davis, U.S. Department of Agriculture-Natural Resources Conservation Services

Minimizing Dredging Costs Through Prevention of Erosion and Sedimentation: Case Study of Dredging Costs in the Maumee River

Brent Sohngen, The Ohio State University

Development of a Sedimentation Model for a Proposed Sediment Trap in Trail Creek, Indiana

Ajit Vaidya, Environmental Engineer, USACE

The U.S. Army Corps of Engineers (USACE) maintains a federal navigation channel at Michigan City Harbor and Trail Creek in Michigan City, Indiana. The Corps periodically performs routine dredging in the harbor and federal channel to ensure adequate navigational depths. Elevated levels of some contaminants prohibit open water disposal of the dredged sediment. As such, the sediments have been placed in an upland confined disposal facility (CDF). Disposal of contaminated sediments in a CDF is costly, and it is difficult to find suitable disposal sites. Alternative approaches to sediment management must be proactive, minimizing the volume of contaminated sediment to be dredged and preventing sediments from becoming contaminated in the first place.

The USACE investigated the feasibility of building a sediment trap upstream of the federal channel in Trail Creek and Michigan City Harbor. Sampling data indicate that the sediments become progressively more contaminated as they travel downstream through the federal channel and harbor. The purpose of the sediment trap would be to collect clean sediments deposited in Trail Creek before they travel into the federal channel and become associated with the contaminated sediment. In this manner, the sediment dredged from the sediment trap would be clean enough to be disposed in the open waters of Lake Michigan. Such an approach would reduce the need to dredge contaminated sediments and prevent clean sediments from mixing with already contaminated material. The USACE performed a series of sedimentation studies using the HEC-6 sedimentation model. The results indicated that construction of a sediment trap upstream of the federal channel would be a feasible and useful method of reducing contaminated sediment removal in Trail Creek and Michigan City Harbor. Further studies are needed to assess the economic benefits associated with the sediment trap project.

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NRCS Sedimentation/Dredging Study in the Maumee River Basin/ Toledo Harbor Sediment Reduction Project

Steve Davis, USDA-NRCS

The Port of Toledo is one of the Great Lakes' busiest with annual shipping values reaching into the tens of millions of dollars. In order to keep the port open, it is necessary to dredge the shipping channel annually to a navigable depth of 26 feet. On the average, 850,000 cubic yards of sediment is removed each year at an average cost of $3-5 million dollars. More than half the soil removed comes from upland erosion from the farm fields of Ohio, Indiana and Michigan. The soil is carried to the harbor by the Maumee River and its tributaries.

Dredging the harbor creates numerous economic and environmental problems. In addition to the large cost of removal, which is paid for by fees assessed to ships that use the various ports around the country, disposal of the dredged material presents an economic and environmental challenge. Part of the material is polluted and must be disposed of in confined disposal facilities (CDFs). These facilities are expensive to site and build, and space for new facilities is limited. The less polluted material is disposed of by dumping in the open lake. This practice is the subject of environmental controversy.

In order to reduce the dredging costs, dredging problems, and to keep the port open, a Toledo Harbor Long Term Management Team was formed. This group, composed of local, state and federal officials, recommended a long term program to reduce soil erosion as a partial solution to the dredging problem. The USDA-Natural Resources Conservation Service (NRCS) took the lead in formulating this portion of the long-term management plan for the harbor. The NRCS proposal called for a five-year plan that would reduce sedimentation by 130,000 cubic yards annually, at an estimated cost of $1.5 million per year or a total cost of $7.5 million. The plan called for redirecting dredging funds for upland erosion control.

In October 1996, the U.S. Army Corps of Engineers awarded NRCS $700,000 for a two-year pilot demonstration project. NRCS utilized these funds to carry out locally led sediment reduction projects in soil and water conservation districts within the Maumee basin.

This presentation reviewed and summarized the results of this Toledo Harbor Pilot/Demonstration Project, including how the project was carried out, the project accomplishments, and the NRCS vision for moving forward with implementation of the full erosion control project as envisioned in the Long Term Management Plan.

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Minimizing Dredging Costs Through Prevention of Erosion and Sedimentation: Case Study of Dredging Costs in the Maumee River

Brent Sohngen, The Ohio State University

Soil erosion often has unintended offsite impacts far downstream from where the erosion actually occurs. By affecting water clarity and quality, sediments in streams and rivers can have measurable impacts on aquatic systems and economic systems. Because some individuals or groups spend resources avoiding the harmful economic impacts of soil erosion, some impacts can be quantified in dollar terms. One example of avoidance behavior such as this occurs with dredging and related confining costs. By measuring the reduction in dredging and confining costs that would occur if soil erosion was reduced, we can begin to place an economic value on the offsite impacts of soil erosion.

This research uses the case of the Maumee River basin to illustrate how these cost savings can be estimated. The study examines how dredging and soil confinement costs relate to sediment loads in Toledo Harbor, and how these costs would adjust if sediment loads were reduced. The Maumee River basin is the largest single watershed in the Great Lakes basin, and it delivers the most sediment to the lakes, suggesting that the costs in this region are likely to be an important component of the overall impact of upstream soil erosion. Further, the Toledo Harbor serves as a shipping port for many regional commodities, including grain from Midwestern farms and coal from Ohio mines.

Because Toledo Harbor is a federal navigation channel, the U.S. Army Corps of Engineers spends an average of $2.2 million dollars each year dredging the harbor and the approach channel in Lake Erie. The possibility that sediments are contaminated by toxic chemicals leaching from local landfills causes the U.S. Army Corps of Engineers to confine sediments dredged from the harbor itself in a confined disposal facility. Approximately one-half of sediments dredged each year are confined. Although material dredged from further out in Lake Erie currently is disposed with open lake dumping, the U.S. Environmental Protection Agency has issued an order that all sediments eventually must be confined.

The research is presented in the following pieces. A general background of the Maumee River basin and related soil erosion issues is first reviewed. The paper then discusses how estimates were derived for the costs of dredging and confining. These costs are then linked to reductions in soil erosion, and the dollar value of soil erosion's affect on dredging costs are then predicted. These estimates suggest that a 15 percent reduction in soil erosion in the Maumee River basin could allow the Army Corps of Engineers to avoid up to $1.3 million per year in dredging and confining costs in Toledo Harbor.

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Economic Incentives and Other Approaches for Promoting Erosion Control BMPs for Business and Industry

Moderator: LeRoy Gross, Erie County Conservation District, Pennsylvania

Are Green Lots Worth More than Brown Lots? An Economic Incentive for Erosion Control on Residential Lots
Jon Harbor, Purdue University, Indiana

The Kalamazoo River Water Quality Trading Demonstration Project – Forging Non-Traditional Partnerships to Achieve Economic and Environmental Benefits
Patricia Adams, Forum for Kalamazoo County, and
Mark Kieser, Kieser and Associates, Michigan

Point-Nonpoint Source Pollution Trading
Dave Batchelor, Michigan Department of Environmental Quality

Are green lots worth more than brown lots? An economic incentive for erosion control on residential developments

Jon Harbor, Purdue University , Indiana

Construction sites are major contributors to nonpoint source pollution because of the high rate of soil erosion that occurs when large areas are disturbed and left bare for extended periods of time. Erosion control is lacking on many residential construction sites because of cost concerns on the part of developers, and because of a shortage of personnel to enforce erosion control regulations. New approaches are needed to increase erosion control on construction sites if this source of nonpoint source pollution is to be significantly reduced.

Widespread voluntary use of erosion control might be possible if developers believed they could make a profit on the money they invest in erosion control. Using a market survey approach we conducted a pilot study to evaluate whether realtors, developers and home buyers value green lots significantly higher than brown lots. The increase in price placed on green lots by home buyers and realtors was more than double the cost of seeding. Thus we can suggest that developers use vegetative cover to increase profits, in addition to its role in reducing erosion and offsite sedimentation.

Project website:

uval.cas.purdue.edu/grbrres.html

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The Kalamazoo River Water Quality Trading Demonstration Project: Forging Non-Traditional Partnerships to Achieve Economic & Environmental Benefits

Patricia Adams, Forum for Kalamazoo County and Mark Kieser, Kieser and Associates, Michigan

This project places the Kalamazoo River Watershed on the cutting edge of a nationwide initiative to improve watershed management capabilities using tools within the *Clean Water Act* to sustain local economies while optimizing costs for environmental improvement. One such tool, is Water Quality Trading, a market-based approach to environmental protection in watersheds. Trading involves voluntary pollutant reductions at one source that are used by another source to provide operational flexibility or to comply with permitted discharge limits. Such "trades" can allow for environmentally-sound, cost-effective economic expansion and community growth that might otherwise be prohibited under traditional permitting approaches.

For trading to occur, one source must first make reductions beyond the level of control required by law or permit to generate "credits." A portion of these credits may be used by another source while the remainder are retired. This retirement of credits with each trade results in a net environmental benefit in water quality. The Kalamazoo River Trading Demonstration Project focuses on reductions of phosphorus to the river from nonpoint sources, such as urban stormwater, agricultural runoff or other sources of unregulated runoff, to generate credits which could be used by permitted point sources, such as industries and municipal wastewater treatment plants. Twice as much phosphorus is removed, typically at a lower cost, through voluntary nonpoint source reductions than is used by the point source. This "two-to-one" trading ratio results in a 50 percent reduction in phosphorus additions to the river beyond that which would have been achieved through additional, often higher-cost, point source treatment alone.

Market-based trading demonstrated in other areas of the country has resulted in:

- development of new pollution control technologies;
- development of pollution prevention programs;
- pollutant source reduction prior to new regulations;
- implementation of voluntary pollution reduction programs for stormwater runoff and soil erosion; and
- new watershed planning initiatives.

The Kalamazoo River project focuses on a demonstration of the effectiveness of voluntary, nonpoint source control programs and the potential environmental and economic benefits of watershed-based nutrient trading in this watershed and within the Great Lakes region. These efforts meet and exceed criteria under the U.S. EPA's 1996 Draft Framework for Watershed-Based Trading.

Since the project's inception in early 1997, a diverse group of stakeholders have participated and directed this effort as a formal steering committee. The nontraditional partnerships formed through this project have attracted regional and national attention from others seeking to implement trading programs. Lessons learned from this project are being used to assist in the development of a statewide trading program in Michigan (the first in the country) and eight other states planning to establish watershed-based trading programs.

Up to $100,000 of the nearly $550,000 budget for the demonstration project are ear-marked for making real, nonpoint source reductions to the Kalamazoo River at a variety of sites using traditional and innovative control strategies. Monitoring and the technical evaluation necessary to document changes at nonpoint source sites represent a substantial portion of the project efforts. Communication of results and discussion of the drivers and barriers to trading with other Great Lakes states through a regional network are other key project components.

The project co-principal investigators and members of the project Steering Committee gratefully acknowledge support provided by the Kalamazoo Foundation's Sustainable Community Watershed Fund, Great Lakes Protection Fund, Water Environment Research Foundation, U.S. EPA Assistance Agreement #X824468, substantial in-kind contributions from project participants, and private funding.

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Point-Nonpoint Source Pollution Trading

David Batchelor, Michigan Department of Environmental Quality

Water quality trading is a market-based watershed strategy that can optimize the costs of improving water quality, accommodate growth, promote ecologically sound development and provide greater regulatory flexibility. Trading programs are emerging as instruments to implement total maximum daily loads required under the federal *Clean Water Act*, facilitate community-based watershed management planning, and encourage voluntary loading reductions from nonpoint sources.

This presentation described how water quality trading is different from effluent trading and discusses open and closed trading systems. The findings and recommendations of a feasibility study conducted by the Surface Water Quality Division of the Michigan Department of Environmental Quality were summarized. The process, timeline and framework for developing a statewide water quality trading program were presented.

How the results and lessons learned from a demonstration trading project in Kalamazoo, Michigan, and the development of a statewide program can be applied to other parts of the Great Lakes were also briefly described.

Additional information can be obtained from the MDEQ Surface Water Quality Division Trading home page at www.deq.state.mi.us/swq/trading/temp5x.htm.

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Erosion Control in the Coastal Zone: Shoreline Stablization and Other Approaches

Moderator: Wayne Warren, Ohio Department of Natural Resources

Coastal Erosion and Fluctuating Lake Levels
Donald Guy, Ohio Department of Natural Resources

Shoreline Stabilization Along Lake Superior's North Shore
Gene Clark, Minnesota Board of Water and Soil Resources

Ravine Erosion Control — Sediment/Nutrient Transport Reduction Through Vegetative Stabilization
Charles Shabica, Shabica and Associates, Illinois

Coastal Erosion and Fluctuating Lake Levels: A Perspective from Ohio

Donald Guy, Ohio Department of Natural Resources

Ohio's lakeshore stretches approximately 420 kilometers along the southwest shore of Lake Erie. Low-relief clay banks, barrier beaches and wetlands characterize the western third of the lakeshore, and higher relief (less than 20 meter) bluffs and slopes of rock, till, and glaciolacustrine sediments characterize the eastern two-thirds of the lakeshore. Beach widths are typically less than 7.6 meters, and numerous shore protection/flood control structures have been built. Erosion is a hazard along all of the Ohio lakeshore except for some rockbound reaches, but flooding is a significant hazard only along the low-relief western lakeshore.

From the record low level of 1934, Lake Erie rose to successively higher record levels in 1952, 1973, and 1985-1986, and was at near-record high levels in 1997. The rise from 1934 to 1997 was 1.6 meters. Superimposed on the long-term rise in lake level are annual fluctuations from mid-winter low to mid-summer high of about 0.36 meters and storm surges of 2.1 meters. Concurrence of storm surges, annual high levels, and record-high levels typically results in significant erosion and flooding.

Erosion rates average about 0.5 meters per year; however, annual recession rates of 4.6 meters per year in 18-meter-high till bluffs, 6.7 meters per year in low clay banks, and 18.3 meters per year along barrier beaches have been documented. During periods of above average lake levels, annual erosion rates may be eight times more than average long-term rates. For different time periods, rates typically display considerable temporal and spatial variability.

Erosion has been a serious problem for Ohio because much of the lakeshore is urban. Twenty-five percent of the more than 5,000 homes and buildings occupying lakefront parcels are within 7.6 meters of the bank/bluff line, and another 22 percent are between 7.9 and 15.2 meters of the bank/bluff line. During the high-water period of 1972-1976, damages and costs due to erosion and flooding were approximately $95.2 million (U.S. Army Corps of Engineers, 1979). The Lake County Planning Commission estimated that, during the high water of 1985-1986, loss and/or repair of homes, infrastructure and shore protection structures, plus loss of tax revenues, totaled $9 million dollars along the county's 31 miles of lakeshore.

To slow erosion, many shore-protection structures have been built, and nearly 45 kilometers of dikes protect low-lying residential, agricultural, and wetland areas along the western lakeshore. Evolution of shore protection from groins in the 1950s, groins and sea walls in the 1970s, modular breakwaters in the 1980s, and rubble mound revetments in the 1990s, reflects property owners' efforts to cope with dwindling beaches and rising lake levels.

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Shoreline Stabilization Along Lake Superior's North Shore

Gene Clark, Minnesota Board of Water and Soil Resources

The Minnesota Board of Water and Soil Resources Lakeshore Engineering Program works with the Lake Superior Soil and Water Conservation Districts to educate landowners, design erosion control best management practices (BMPs) and provide construction oversight for erosion control project installations. Through the soil and water conservation districts, we work one-on-one with property owners to reinforce erosion and water quality BMP education and information transfer as part of the total engineering services to them. Completed shoreline erosion control projects are used as models for other property owners to follow when reviewing options for appropriate Lake Superior erosion control.

Four recent grants under the Great Lakes Basin Program for Soil Erosion and Sediment Control were highlighted to demonstrate how the Minnesota Lakeshore Engineering Program has utilized grant dollars to provide education and training for both private property owners as well as the local resource people. Vegetation and low cost erosion control demonstration projects also have been installed to demonstrate the effective, and sometimes innovative, non-conventional methods for Lake Superior erosion control. The results of these projects were also discussed.

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Ravine Erosion Control – Sediment/Nutrient Transport Reduction Through Vegetative Stabilization

Charles Shabica, Shabica and Associates , Illinois

This project represents a collaborative effort between the city of Highland Park and Northeastern Illinois University to implement and monitor methods for stabilization of actively eroding ravines that flow into Lake Michigan.

Urbanization along many of the shores of the Great Lakes has led to increased levels of nonpoint source pollution entering the lakes. Further, wooded ravines that may have been stable for thousands of years have recently undergone active stream bed down cutting and bank erosion that can be attributed primarily to loss of natural stream bed armor and higher levels of stormwater runoff.

This study has shown that stormwater erodes more than 3,000 tons of sediment annually from Highland Park ravines. Sand, silt and clay, in addition to large quantities of untreated sewage from broken ravine bed sewers, were observed entering Lake Michigan via the ravines. Several methods for mitigating ravine erosion were tested in Highland Park and Lake Bluff, Illinois. Results show that of five methods studied, restoration of stream bed armor is a low-tech, cost-effective and environmentally-sound method for reducing sediment and nonpoint source pollution loading to the Great Lakes.

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Erosion Control BMPs for Forestry Management and Road Construction/Maintenance

Moderator: Mark Nelson, Minnesota Board of Water and Soil Resources

Rapid River Road/Stream Crossing Restoration
Russ LaRowe, Michigan Agricultural Stewardship Association

Great Lakes Better Backroads Demonstration Project and Guidebook An Educational Dcument and Workshop Program
Brian Benjamin and Daniel Sikarskie
Huron Pines Resource Conservation and Development Council, Michigan

Water Quality BMPs on Forest Lands
Mark Watts, Chemung Soil and Water Conservation District, New York

Rapid River Road/Stream Crossing Restoration

Russ LaRowe, Michigan Agricultural Stewardship Association

In the course of working on unpaved rural roads in northern Michigan, two issues become apparent. The first is the low priority placed on these roads by county road commissions. Low traffic numbers prohibit expensive bridge building and paving projects. The second issue is one of stream access. In watersheds with wetland corridors adjacent to the stream, the road crossing serves as public access to the stream. Roads built around the turn of the century narrow the stream at the crossing point by using undersized and short culverts. As roads were widened to handle modern traffic, the bottleneck became the stream crossing.

Attempts at inexpensive fixes have been only marginally successful. For some time, culvert extensions were attached to culvert ends, allowing the roadbed to be reshaped to a more desirable 2 to 1 slope where sod could be established to filter runoff before it enters the stream. Our request for culvert extensions was denied by the Michigan Department of Environmental Quality, and an alternative low-cost fix had to be identified.

Seven road/stream crossings were repaired by installing head walls at the culvert ends. These head walls are made of treated lumber and allow the roadbed to be stabilized at the steam crossing by forming a retaining wall from the top of the culvert to the roadbed. The roadbed no longer washed out over the culvert and road runoff can be diverted to wetland areas before entering the stream. This method of repair has worked well as temporary solution. It does not allow for further widening of the roadbed and does not solve problems associated with undersized culverts.

Undersized culverts continue to cause water quality problems. In one case, we removed an undersized culvert and replaced it with a properly sized concrete box culvert. In an attempt to keep installation costs low, we poured the culvert in place instead of using a pre-cast system. In this case we were successful in relieving the ponded water on the upstream side of the culvert and stabilizing the roadbed at a minimal cost.

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Great Lakes Better Backroads Demonstration Project and Guidebook: An Educational Document and Workshop Program

Brian Benjamin, Huron Pines Resource Conservation and Development Council, Michigan

The Great Lakes region is blessed with a wealth of high quality, cold water streams capable of supporting a plenitude of cold water organisms. The same geologic features that support this perennial flow of cold water are also the streams' nemesis. Sandy soils, typical in glacial outwash areas, provide a medium for the percolation of precipitation, thus replenishing the supply of groundwater. High quality streams rely on groundwater to maintain their constant cool temperatures.

Sand soils often create a pollution problem at areas of road stream crossings. Transportation networks across the Great Lakes region have provided the area with greatly needed infrastructure to support local economies, much to the detriment of these cold water streams. Many of these sources of sediment into stream channels can be controlled with minimal expense by incorporating minor structures and consistent maintenance. A great deal of progress has been made on many crossings in the region, but without proper maintenance, these improvements do not function properly. The necessary component is a comprehensive educational tool necessary to instruct road maintenance personnel on the various techniques and strategies to minimize the input of this widespread pollutant, and to provide the scientific and economic rational for this resource protection.

This program involves two education components, the first of which is to develop a manual of best management practices pertaining to road maintenance at stream crossings. The manual is then used to conduct workshops directed toward agencies responsible for road maintenance. These workshops not only highlight the "how-to" aspect of erosion control, but heavily emphasize the "why" aspect, particularly as it relates to resource impairments near road stream crossings.

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Water Quality BMPs on Forest Lands

Mark Watts, Chemung County Soil and Water Conservation District

Chemung County Soil and Water Conservation District (SWCD) recognized a need for sharing information on how to install soil erosion best management practices (BMPs) on timber harvesting projects among those persons involved in forestry, such as landowners, timber harvesters, town and township supervisors, highway superintendents, code enforcement officers, and foresters. The goal of the Chemung SWCD was to provide uniform and accurate information to this group of people. Through a grant from the Great Lakes Basin Program for Soil Erosion and Sediment Control, the Chemung County SWCD was able to prepare a manual of forestry BMPs.

The District contracted with a researcher who prepared a rough draft which was then circulated to many forestry, soil erosion/sediment control professionals for review and critique. After a lengthy review process, the manual was printed, resulting in an excellent source of information that has been very well-received.

With the BMP booklet in hand, the District was able to host a workshop utilizing the new manual. The District invited forest owners from the Master Forest Owners' Association, the New York Forest Owners Association, county and town highway superintendents, and code enforcement officials from Chemung and neighboring counties. Forty-one participants from seven counties and 23 towns were involved. Chemung County SWCD personnel as well as a private forestry consultant and representatives from Coastal Lumber Inc., and Cotton-Hanlon Inc. conducted the workshop. The instruction consisted of both in-class work and a tour of logging operations in the county that highlighted sample BMPs. The District intends to continue using the manual to conduct forestry workshops. In addition, the New York State Department of Environmental Conservation, other conservation districts and Cornell University have all requested copies to use as reference material for other workshops held throughout the state.

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Keynote Address

Addressing Resource Conservation Needs in the Midwest

William J. Gradle, State Conservationist, USDA-NRCS

In the United States, there is a disconnect between the amount of federal money spent for private conservation efforts as compared to the amount spent on public lands. Although private land constitutes 80-90 percent of the land-mass in the contiguous United States, Congress annually allocates only a little over $1 billion to conservation on these lands. In contrast, Congress annually appropriates $15 billion for conservation efforts on public lands. One way to address that discrepancy is to introduce urban dwellers to the nonpoint pollution issues rural landowners face so they might encourage their congressional representatives to increase funding for conservation efforts on private land.

The USDA-Natural Resource Conservation Service (NRCS) launched the Backyard Conservation Effort on Earth Day, 1998, in an attempt to bring together urban and rural nonpoint pollution problems and create a link between these issues in the mind of the urban public. The effort is aimed at one million urban dwellers through a video and booklet that outline issues such as nutrient management, pest control, composting, and building wetlands and ponds. In the process of discussing how urbanites can address these issues, the package draws parallels with the problems faced by rural landowners. (A copy of the package can be obtained by calling 1-888-LANDCAR.)

The Backyard Conservation Effort has enhanced NRCS's ability to build partnerships with a number of organizations and agencies. The primary partners are the National Association of Conservation Districts and the National Wildlife Council. Partnership building is an important aspect of this process and, although it has been forced upon government agencies through downsizing, it can be seen as a positive practice because it enables agencies to share information and resources, and to reach a larger audience than they might otherwise reach on their own. NRCS partnerships start at the watershed level, bringing together all of the stakeholders to work through the process. The greater the number of partners, the more resources there are available to address problems. Partnerships are important to implementing conservation efforts and developing environmental programs across the spectrum.

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Setting the Agenda: Issues and Challenges for Local Nonpoint Source Pollution Control Efforts

Moderator: Bill Horvath, National Association of Conservation Districts Policy Center

David Cowgill,
U.S. EPA, Great Lakes National Program Office

Bruce Kirschner,
International Joint Commission

Wayne Warren,
Ohio Department of Natural Resources

LeRoy Gross,
Erie County Conservation District, Pennsylvania

Vivian Brighton,
River Raisin Watershed Council, Michigan

Kathy Kos,
Ducks Unlimited, Michigan

Michael J. Donahue,
Great Lakes Commission

Setting the Agenda: Issues and Challenges for Local Nonpoint Source Pollution Control Efforts

Moderator:
Bill Horvath, NACD Policy Center

During this final plenary session, we will hear the views of individuals representing a variety of local, state, federal, regional and international agencies and private organizations with an interest in, or mandate to conserve and protect Great Lakes soil and water resources. These panelists were asked in advance to identify the key challenges to be faced by soil erosion and sediment control professionals in their agency/organization in the immediate future.

Bruce Kirschner, International Joint Commission, Great Lakes Regional Office

Looking at the challenges from an international perspective, agency arrangements and efforts do not cross the border as readily as nonpoint source pollution. Information, techniques and concepts need to be disseminated among the agencies responsible for managing soil erosion, especially across the border. It is no longer affordable for the state/provincial and federal governments to duplicate research efforts. Similarly, it is time that these agencies move past a discussion of the ecosystem approach to management and begin to implement it.

David Cowgill, U.S. EPA , Great Lakes National Program Office

The agencies need to integrate and relate issues, such as sediment dredging, agricultural erosion control and habitat protection, to get people thinking in a systemic way. The primary challenge is to the individuals working within the agencies. Will they be able to step outside the agency boxes and try to integrate the various single-issue programs? Success will depend upon open-mindedness, creativity and shared lessons. Fortunately, people are very engaged and there is already a good pattern of cooperation and information exchange.

Wayne Warren, Ohio Department of Natural Resources

The states are going to have to prioritize issues and form partnerships in order to augment their ability to address critical issues. Cultural and political differences from state-to-state and within states mean that both federal and state programs addressing erosion and sediment control must be flexible.

LeRoy Gross, Erie County Conservation District, Pennsylvania

Conservation districts provide many multi-faceted programs that require better information management. Therefore, technology acquisition, use and transfer at the local level is going to be a growing challenge. At the same time, water quality is linked to land-use practices and there will come a point where stronger regulation and enforcement, rather than education, are going to be required.

Vivian Brighton,
River Raisin Watershed Council, Michigan

From the watershed perspective, public education is the largest challenge. Altering the public's perception that there are not water quality problems or, if there are, that the experts will look after them, is a significant challenge. The public needs to hear that there are preventive measures that can be taken and they must be encouraged to do so. These issues, when they appear in our local newspapers, must be moved from page 13 to the front page!

Kathy Kos,
Ducks Unlimited, Michigan

Ducks Unlimited's strength is in forming partnerships. DU is good at fundraising and sees itself as a funding and manpower source for wetland and habitat issues. The most significant challenge is a complex permitting system that doesn't account for the expertise of the permittee and thus slows down the partnering process.

Conference Concluding Remarks

Michael J. Donahue,
Great Lakes Commission

The conference raised several points. Soil erosion issues have entered the mainstream and come to the fore since initial serious discussions in the 1970s. The solution to soil erosion and sediment control is ultimately local. Partnership is the key concept in delivering successful programs. In fact, partnerships have become so innovative that a paradigm shift has occurred. For example, the "top down" management approach has been replaced by "bottom up" initiatives. Various types of non-profit organizations have assumed key roles. Finally, a challenge: professionals in this area need to market their programs in a way which publicizes their benefits, especially economic, and encourages further investment from both public and private sources.

APPENDIX ONE

Agenda: *Keeping it on the land...and out of the water!* – September 16-18, 1998

Agenda: *Beneficial Use of Dredged Material: A Regional Workshop for The Great Lakes* – September 15-16, 1998

Agenda: *Opportunities and Obstacles in Nonpoint Pollution Control: A Post-PLUARG Perspective* – September 16, 1998

Keeping it on the land... and out of the water!

Soil Erosion and Sediment Control Opportunities for the Great Lakes Basin

Sept. 16-18, 1998
Radisson Hotel and SeaGate Centre
Toledo, Ohio

Featuring presentations on federal, state, regional and local initiatives affecting resource conservation efforts in the Great Lakes basin and techniques for reducing nonpoint source pollution in both rural and urban environments.

Sponsored by: Great Lakes Commission
National Association of Conservation Districts - Great Lakes Committee
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
USDA - Natural Resources Conservation Service
Great Lakes Science Advisory Board, International Joint Commission
Ohio Department of Natural Resources

A Note to Conference Participants

Thank you for joining us to learn about soil erosion and sediment control opportunities in the Great Lakes Basin. We hope you find the conference both informative and enjoyable. The final conference program is outlined below. Additional logistical details are discussed on the back of this program. Please note that conference activities are taking place in both the Radisson Hotel and the adjacent SeaGate Centre. The location and room assignment for each activity are noted below, and a layout of both facilities is provided on the blue sheet in your conference folder. Direct access is available between the Radisson Hotel and SeaGate Centre and signs will be posted showing the way.

Conference Program

Wednesday, September 16

11:00 a.m.

Registration *(SeaGate Centre, Room 304-308)*

1:00 p.m.

Conference Welcome and Opening Keynote Address *(SeaGate Centre, Room 304-308)*
John Kohl, Chair, NACD, Great Lakes Committee and Michael J. Donahue, Executive Director, Great Lakes Commission

Keynote Address: An Ecosystem Approach to Water Quality Management in the Great Lakes
Ron Nargang, Deputy Commissioner, Minnesota Department of Natural Resources

1:30 p.m.

Challenges and Opportunities for Soil Erosion and Sediment Control in the Great Lakes
(SeaGate Centre, Room 304-308))

Moderator: Jerry Wager, Ohio Dept. of Natural Resources

The Clean Water Action Plan: What Does it Mean for Nonpoint Source Pollution Control in the Great Lakes?
Dov Weitman, Chief, Nonpoint Source Control Branch, U.S. Environmental Protection Agency
Hiram Boone, Associate Director, Gulf of Mexico Program, USDA-NRCS

Lakewide Management Plans and Other Approaches to Water Quality Management in the Great Lakes
Francine Norling, Lake Erie Team Manager, U.S. Environmental Protection Agency

The National Conservation Buffer Initiative
Thomas J. Hoogheem, Global Director of Field Environmental Operations, Monsanto Corporation

3:15 p.m.

Break

3:30 p.m.

Watershed Planning in an Urban Environment: Approaches for Addressing Development, Imperviousness and Soil Erosion *(SeaGate Centre, Room 304-308)*

Thomas Schueler, Executive Director, Center for Watershed Protection, Inc.

5:25 p.m.

Conference Logistical Details *(SeaGate Centre, Room 304-308)*

Matt Doss, Great Lakes Commission

5:30 p.m.

Reception for Conference Attendees *(Radisson Hotel, Orleans and Tontagany Rooms, Third Floor)*

Thursday, September 17

7:30 a.m.

Continental Breakfast *(SeaGate Centre, outside Rooms 202-208)*

8:00 a.m.

Concurrent Sessions - Block 1 *(SeaGate Centre)*

Five sessions will be presented concurrently and repeated at 10:15 a.m. Each session will include an overview presentation followed by case studies of current demonstration projects and conservation initiatives in the Great Lakes region.

Habitat Protection and Restoration and Bioengineering for Soil Erosion and Sedimentation Control
(SeaGate Centre, Room 202-204)

- *Swan Creek Bioengineering Project:* Stephen Kunselman, Sumpter Township (Michigan)
- *Marketing Wetlands for Profit:* Bernard Czartoski, Maumee Valley RC&D (Ohio)
- *Fish Creek Project:* Larry Clemens, Nature Conservancy (Indiana)
- *Moderator:* Karen Holland, U.S. Environmental Protection Agency (Illinois)

Monitoring and Indicators for Soil Erosion and Sedimentation *(SeaGate Centre, Room 206-208)*

- *Lake Erie and Lake St. Clair NAWQA:* Donna Myers, U.S. Geological Survey (Ohio)
- *Sedimentation in the Maumee River:* Peter Richards, Heidelberg College (Ohio)
- *Streammbeddedness, Siltation and Monitoring:* Steve Largent, Grand Traverse Conservation District (Michigan)
- *Moderator:* Dan Bauer, U.S. Geological Survey (Illinois)

Concurrent Sessions - Block I (continued)

Soil Erosion and Sediment Control in an Urban Environment *(SeaGate Centre, Room 302-304)*

- *NPDES/Stormwater Management Programs:* Peter Swenson, U.S. Environmental Protection Agency (Illinois)
- *BMP Workshop–Streambank Erosion in Urban Environments:* Paul Novak, U.S. Environmental Protection Agency (Ohio)
- *The Countryside Program–Maintaining a Rural Character in Urban Environments:* Keith McClintock, Geauga SWCD (Ohio)
- *Construction Site Erosion Control/BMPs on Construction Sites*, Jim Storer, USDA-NRCS (Ohio)
- *Moderator:* Maurine Orndorff, National Association of Conservation Districts, Great Lakes Committee (Ohio)

Keeping it on the Land: Agricultural Practices for Erosion Control *(SeaGate Centre, Room 306-308)*

- *Trends in No-Till Agricultural Practices:* Greg Lake, Allen Co. SWCD (Indiana)
- *Reduced Erosion Through Sustainable Agricultural Practices:* Russ LaRowe, Michigan Agricultural Stewardship Association
- *Strip-Till Equipment Lease Program/Heavy Residue Management System:* Bob George, Wood SWCD (Ohio)
- *Moderator:* John Kohl, Chair, Great Lakes Committee, National Association of Conservation Districts (Wisconsin)

Buffer Strips and Streambank Management for Livestock Operations *(SeaGate Centre, Room 211)*

- *Lake Erie Buffer Strip Initiative:* Steve Davis: USDA-NRCS (Ohio)
- *Streambank Stabilization "Erosion Runoff" Control Project:* Dona Hunter, Coordinator, LaGrange SWCD (Indiana)
- *Grazing/Water Supply Erosion Control Project:* Harvey Pinkerton, Penn Soil RC&D (Pennsylvania)
- *Moderator:* Jon Bartholic, Institute of Water Research, Michigan State University

9:45 a.m.

Break *(SeaGate Centre, outside Rooms 202-208)*

10:15 a.m.

Repeat of Concurrent Sessions - Block 1 *(SeaGate Centre, same rooms as for the 8:00 a.m. sessions)*

12:00 noon

Luncheon *(SeaGate Centre, Room 312-316)*

Welcome to Toledo
Carleton S. Finkbeiner, Mayor, City of Toledo

Keynote address: The Land-Use/Water Quality Connection and the IJC's Role Under the Great Lakes Water Quality Agreement
Thomas P. Behlen, Director, Great Lakes Regional Office, International Joint Commission

1:30 p.m.

Concurrent Sessions - Block 2 *(SeaGate Centre)*

Five sessions will be presented concurrently and repeated Friday morning at 8:00 a.m. ***NOTE:*** *The Friday morning sessions will be held in the Radisson Hotel.*

Minimizing Dredging Costs Through Prevention of Erosion and Sedimentation *(SeaGate Centre, Room 202-204)*

- *Dredging Impacts Study Along Trail Creek, Indiana:* Ajit Vaidya, Environmental Engineer, USACE (Illinois)
- *NRCS Sedimentation/Dredging Study in the Maumee River Basin:* Steve Davis, USDA-NRCS (Ohio)
- *Case Study of Dredging Costs in the Maumee River:* Brent Sohngen, The Ohio State University
- *Moderator:* Jim Bredin, Michigan DEQ

Economic Incentives and Other Approaches for Promoting Erosion Control BMPs for Business and Industry *(SeaGate Centre, Room 206-208)*

- *Construction Site Erosion Control Incentives:* Jon Harbor, Purdue University (Indiana)
- *Point-Nonpoint Source Pollution Trading:* Dave Batchelor, Michigan Dept. of Environmental Quality (Thursday)
- *Kalamazoo Demonstration Project–Citizens' Perspective:* Patricia Adams, Forum for Kalamazoo County (Michigan) (Friday)
- *Kalamazoo Demonstration Project–Technical Perspective:* Mark Kaiser, Kaiser and Associates (Michigan)
- *Moderator:* LeRoy Gross, Erie County Conservation District (Pennsylvania)

Erosion Control in the Coastal Zone: Shoreline Stabilization and Other Approaches *(SeaGate Centre, Room 302-304)*

- *Coastal Erosion and Fluctuating Lake Levels:* Donald Guy, Ohio Dept. of Natural Resources
- *Shoreline Stabilization Along Lake Superior's North Shore:* Gene Clark, Minnesota Board of Water and Soil Resources
- *Ravine Erosion Control:* Charles Shabica, Shabica and Associates (Illinois)
- *Moderator:* Wayne Warren, Ohio Dept. of Natural Resources

Erosion Control BMPs for Forestry Management and Road Construction/Maintenance *(SeaGate Centre, Room 306-308)*

- *Rapid River Road/Stream Crossing Restoration:* Russ LaRowe, Michigan Agricultural Stewardship Association
- *Great Lakes Better Backroads Demonstration Project and Guidebook:* Brian Benjamin, Huron Pines RC&D Council (Michigan)
- *Water Quality BMPs on Forest Lands:* Mark Watts, Chemung SWCD (New York)
- *Moderator:* Mark Nelson, MN Board of Water and Soil Resources

4:00 p.m.

Maumee River Cruise and Dinner *(Convene in the lobby of the Radisson Hotel)*

Dinner and a cash bar will be provided as the boat cruises up the Maumee River. The cruise will feature presentations on soil erosion and sediment control initiatives in the Maumee River watershed. Participants should convene in the lobby of the Radisson Hotel at 4:00 p.m. to board motor coach transportation to the boat, which will depart from Independence Park at 4:30 p.m. and return at approximately 7:30 p.m.

Friday, September 18

7:30 a.m.

Continental Breakfast *(Radisson Hotel, atrium outside of Ballroom 1)*

8:00 a.m.

Repeat of Concurrent Sessions - Block 2 *(Radisson Hotel)*

- **Minimizing Dredging Costs Through Prevention of Erosion and Sedimentation** *(Radisson Hotel, Ballroom 2)*
- **Economic Incentives and Other Approaches for Promoting Erosion Control BMPs for Business and Industry** *(Radisson Hotel, Ballroom 3)*
- **Erosion Control in the Coastal Zone: Shoreline Stabilization and Other Approaches** *(Radisson Hotel, Ballroom 4)*
- **Erosion Control BMPs for Forestry Management and Road Construction/Maintenance** *(Radisson Hotel, Waynesfield Room*

9:45 a.m.

Break *(Radisson Hotel, atrium outside of Ballroom 1)*

10:15 a.m.

Addressing Resource Conservation Needs in the Midwest *(Radisson Hotel, Ballroom 1)*
William J. Gradle, State Conservationist, USDA-NRCS (Illinois)

10:30 a.m.

Setting the Agenda: Issues and Challenges for Local Nonpoint Source Pollution Control Efforts *(Radisson Hotel, Ballroom 1)*

Moderator: Bill Horvath, Director, NACD Policy Center

Panelists representing various sectors will assess efforts to control nonpoint source pollution, react to the conference presentations and identify priority actions for the Great Lakes basin. Facilitated discussion will follow during which conference participants may ask questions or comment on issues of concern.

David Cowgill, Environmental Scientist, U.S. EPA - Great Lakes National Program Office
Bruce Kirschner, Environmental Scientist, International Joint Commission
Wayne Warren, Chief, Division of Real Estate and Land Management, Ohio Dept. of Natural Resources
LeRoy Gross, Manager, Erie County Conservation District (Pennsylvania)
Vivian Brighton, Executive Director, River Raisin Watershed Council (Michigan)

12:00 noon

Conference Adjourns

Associated Events

The following events are being held in association with the conference and are open to all conference participants.

- **Opportunities and Obstacles in Nonpoint Source Pollution Control: A Post PLUARG Perspective:** Sept. 16, 9:00 a.m.-Noon; sponsored by the International Joint Commission's Science Advisory Board. Radisson Hotel, Ballroom 4.
- **Workshop on the Beneficial Use of Dredged Material:** Sept. 15, 8:00 a.m.-5:00 p.m., Sept. 16, 8:00 a.m.-10:00 a.m.; sponsored by the Great Lakes Dredging Team. Radisson Hotel, Ballroom 1.
- **Great Lakes Dredging Team:** Sept. 16, 1:00 p.m.-5:00 p.m., Sept. 17, 8:00 a.m.-Noon; sponsored by the Great Lakes Commission. Radisson Hotel, Waynesfield Room.
- **National Association of Conservation Districts - Great Lakes Committee:** Sept. 16, 8:00 a.m.-12:00 Noon. Radisson Hotel, Waynesfield Room.
- **Great Lakes Soil Erosion and Sedimentation Task Force:** Sept. 15, 7:00-10:00 p.m.; sponsored by the Great Lakes Commission. Radisson Hotel, Board of Directors Room.

Logistical Details

Registration: A registration table will be maintained during the conference at the following locations:
- Wednesday, 10:00 a.m. to 5:00 p.m., SeaGate Centre, outside of Room 304-308
- Thursday, 8:00 a.m. to 4:00 p.m., SeaGate Centre, outside of Rooms 202-208
- Friday, 8:00 a.m. to Noon, Radisson Hotel, outside of Ballroom 1

Dinner Cruise: The dinner cruise on the Maumee River will take place Thursday evening from 4:00 p.m. to 7:30 p.m. and will feature presentations on soil erosion and sediment control initiatives in the Maumee River watershed. Participants should convene in the lobby of the Radisson Hotel at 4:00 p.m. to board motor coach transportation to the boat, which will depart from Independence Park at 4:30 p.m. and return at approximately 7:30 p.m. Registration for the dinner cruise will remain open until the beginning of the conference on Wednesday at 1:00 p.m. The cost for the dinner cruise is $35.

Meals: A continental breakfast will be provided on Thursday and Friday mornings and lunch will be provided on Thursday. Conference participants are on their own for other meals. Please consult with hotel staff for restaurant recommendations in the downtown Toledo area.

Beneficial Use of Dredged Material
A Regional Workshop for the Great Lakes
Sponsored by Great Lakes Dredging Team
September 15-16, 1998
Radisson Hotel, Toledo, Ohio

Agenda

TUESDAY, SEPTEMBER 15
(Ballroom 1)

7:30 - 8:30 a.m.	Registration	
8:30 a.m.	Opening Remarks	**Chuck Ledin**, Wisconsin DNR and Co-Chair, Great Lakes Dredging Team **Roy Deda,** U.S. Army Corps of Engineers, Great Lakes Office, Chicago and Co-Chair, Great Lakes Dredging Team
9:00 a.m.	**Dredged Material Management Overview**	**Jan Miller,** U.S. Army Corps of Engineers, Great Lakes Office, Chicago
	Beneficial Use of Dredged Material: A National Perspective	**Richard Lee**, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS
10:10 a.m.	Break	
10:30 a.m.	**Session One: Habitat Building Opportunities**	Moderator: **Doug Zande**, U.S. Army Corps of Engineers, Detroit District
	Case Study #1: Pointe Mouilee Confined Disposal Facility and State Game Area (Michigan)	**Richard Micka,** Secretary, Lake Erie Cleanup
	Case Study #2: Pensaukee Harbor (Wisconsin)	**Ron Fassbender,** Wisconsin DNR, Team Leader, Lakeshore Basin
	Panel Discussion	Moderator: **Doug Zande** and presenters **Richard Micka**, **Ron Fassbender**, along with **Kent Kroonemeyer,** U.S. Fish and Wildlife Service and **Jeff Busch**, Ohio Lake Erie Office
Noon	Lunch (Waynesfield Room)	
1:00 p.m.	**Session Two: Upland and Commercial Uses**	Moderator: **Steve Thorp**, Great Lakes Commission
	Case Study #3: Manufactured Soil From Toledo Harbor	**John Loftus**, Seaport Director, Toledo - Lucas County Port Authority

	Case Study #4: Erie Pier-Duluth	**David Bowman**, Physical Scientist, Detroit District, U.S. Army Corps of Engineers
	Panel Discussion	Moderator: **Steve Thorp** and presenters **John Loftus** and **David Bowman**, along with **Floyd Miras,** Maritime Administration - Great Lakes Office, **Mike Dovichi**, Robert E. Lee & Associates, Inc., **Steven Sands**, Consolidated Technologies Inc., and **Paul Hotz**, maumee RAP, Ottawa River Action Group, Hull & Associates
2:30 p.m.	Break	
2:45 p.m.	**Session Three: Shoreline Protection and Restoration Uses**	Moderator: **Wayne Warenn**, Division of Real Estate and Land Management, Ohio DNR
	Case Study #5: Nearshore Disposal of Sand Dredged from Channels along the Ohio Shore of Lake Erie	**Don Guy**, Division of Geological Survey, Ohio DNR
	Case Study #6: Illinois Sand Management Task Force	**Dan Injerd,** Lake Michiagn Management Section, Illinois DNR
	Panel Discussion	Moderator: **Wayne Warren** and presenters **Don Guy**, **Dan Injerd**, along with **Bonnie Eleder**, U.S. EPA
4:30 p.m.	Adjourn Day One	

WEDNESDAY, SEPTEMBER 16

8:00 a.m.	Summary of First Day	**Jan Miller**
8:15 a.m.	**Session Four: Regulatory Issues and Obstacles to Beneficial Use**	Moderator: **Ellen Fisher**, Wisconsin Dept. of Transportation
	Federal Perspecitve	**Scott Cieniawski**, Great Lkaes National Program Office, U.S. Environmental Protection Agency
	Panel Discussion	Moderator: **Ellen Fisher** and presenter **Scott Cieniawski** along with **Greg Sanders**, Ohio Enviornmental Protection Agency and **Amanda Laumeyer**, Grand Cal Task Force, **Dan Helwig**, Minnesota Pollution Control Agency, and **John Loftus**
9:45 a.m.	Workshop Wrap-up	Chuck Ledin and Roy Deda
10:00 a.m.	Adjourn	

Obstacles and Opportunities in Nonpoint Pollution Control:

A Post PLUARG Perspective

9 am — noon
Wednesday, September 16, 1998
Ballroom 4, Radisson Hotel
Toledo, Ohio

sponsored by
Great Lakes Science Advisory Board
International Joint Commission

PROGRAM

9 AM	**Welcoming remarks** by **Dr. Isobel Heathcote**, Professor, University of Guelph, and CoChair, Workgroup on Parties Implementation of the Great Lakes Science Advisory Board
	Urban Considerations — Dr. Thomas Schueler, Executive Director, Center for Watershed Protection
	Discussion
	Rural Considerations — Dr. Terry Logan, Professor, Ohio State University
	Discussion
10 AM	**Break**
10:15 AM	**Convening of Panel** — Each panel member will have 15 minutes for *Remarks and Comments*
	Dr. Trevor Dickinson, Professor of Water Resources Engineering, *Emeritus* University of Guelph
	Dr. Roger Brook, Professor Department of Agricultural Engineering Michigan State University
	Mr. Michael Hunter, CCA, Certified Crop Advisor Bruce AgVise Ripley, Ontario
	Mr. Peter Johnson, Soil& Crop Advisor Ontario Ministry of Agriculture and Food London, Ontario
	Dr. Isobel Heathcote
11:30 AM	**General Discussion** and **Wrapup**
Noon	**Adjourn**

Drs. Schueler and Logan were asked to consider the following six questions in preparation for their urban/rural papers/presentations:

1. In your view, in the past 20 years since PLUARG, what are the most important nonpoint sources of each of the following:

   — nutrients?

   — toxic substances?

   — pathogens?

   In your opinion, how good is the evidence for your answers?

2. What techniques have worked to control these sources? Explain.

3. Have techniques been attempted that did not work? If any, explain.

4. Are there new, emerging techniques that show promise for nonpoint source control?
   If there are, please discuss briefly.

5. What advice or recommendations would you give for nonpoint source control for the next 20 years?

6. Please list any important questions that you think remain to be answered.

We also asked Dr. Logan to address the following question:

To what extent are PLUARG recommendations still being implemented and what role have government programs played in controlling pollution from land use activities?

APPENDIX TWO

Attendees: *Keeping it on the land...And out of the water!* - September 16 - 18, 1998

Attendees: *Beneficial Use of Dredged Material: A Regional Workshop for the Great Lakes* - September 15 -16, 1998

Attendees: *Opportunities and Obstacles in Nonpoint Pollution Control* - September 16, 1998

Attendees

Keeping it on the land...and out of the water!

Soil Erosion and Sediment Control Opportunities for the Great Lakes Basin

September 16 - 18, 1998

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