



Renewing Our Conservation Ethics

Summary
of the
Great Lakes 2000 Symposium
on the Health of the Great Lakes

May 31, 2000
Toledo, Ohio

Hosted by:
Congresswoman Marcy Kaptur
with assistance from
The United States Department of Agriculture
Natural Resources Conservation Service



Summary presented by:
All Ohio Chapter
Soil and Water Conservation Society

Table of Contents

Message from Ohio Congresswoman Marcy Kaptur	3
Executive Summary	5
Summary of Plenary Sessions	6
Concurrent Sessions - Focus of Discussion.....	7
Conclusion.....	23
Presenter Reference	24

Message from Ohio Congresswoman Marcy Kaptur

The Great Lakes Symposium on the Agricultural and Rural Landscape was a two-day event held May 30 and 31, 2000, in Toledo, Ohio. The purpose of the symposium was to provide an opportunity to build a new Great Lakes conservation strategy entering the 21st century - one which recognizes and values the important contributions of the Great Lakes Basin to the region's viability. Through the tours, presentations, and discussions at the symposium, the participants were able to convey a positive message about the benefits of the Great Lakes and articulate the role that the agricultural industry can play in supporting the long-term economic and natural resource sustainability of the region.

It is my hope that this symposium has provided a framework for additional dialogue for a renewed conservation ethic and a renewed sense of urgency in addressing conservation on the land cared for by private landowners in the Basin.



**Congresswoman Marcy Kaptur
9th Ohio Congressional District**

The Great Lakes Basin



Executive Summary

The goal of the Great Lakes 2000 Symposium was to provide an opportunity to build a new Great Lakes conservation strategy for the 21st century, one which recognizes and values the contributions of the Great Lakes Basin to the region's environmental health, natural resource sustainability, and economic viability.

The symposium, hosted by Congresswoman Marcy Kaptur of Toledo, Ohio, (Congressional District 9), highlighted the importance of conservation on private lands to agriculture, the environment, rural communities, and the Great Lakes. The United States Department of Agriculture, Natural Resources Conservation Service (NRCS) cooperated in hosting the event. Over 500 participants along with keynote speakers, panelists, and technical experts shared ideas and discussed ways to build on the environmental improvements that have been made in the Great Lakes watershed which includes parts of eight states and Canada. The Great Lakes contain one-fifth of the world's supply of fresh water and provide drinking water for 30 million people.

The symposium raised awareness about the value of private land conservation, highlighting private landowner's historic tradition of stewardship of natural resources, and what will be facing them in the future. Dialogue and discussion was initiated in breakout sessions. Topics included production agriculture, agriculture policy and the 2002 Farm Bill, urban conservation, fish and wildlife resources, farmland preservation, water quality, total maximum daily loads (TMDLs), carbon sequestration, and utilizing the watershed approach. Prior to the symposium, attendees participated in a tour and a dinner program at the Maumee Bay State Park.

Summary of Plenary Session

The keynote speaker for the plenary session was Deputy Secretary of Agriculture Richard Rominger who noted that farmers in the Great Lakes Basin began using conservation tillage extensively for corn and soybeans in the 1980s, reaching the 50 percent level in the mid 1990s. He said more conservation practices are still needed as “soil is going down the river along with the grain being exported.” Rominger applauded the efforts of a consortium of groups and agencies that have developed and are implementing a strategic plan to help farmers install 60,000 acres of buffers and filters — areas of grass and trees along 5,000 miles of streams and rivers draining into Lake Erie from northern Ohio.



Craig Cox, Executive Vice President of the Soil and Water Conservation Society, a nonprofit, professional society dedicated to fostering the art and science of conservation, lead an open dialogue with a panel that represented farmers, agribusiness, environmental groups, Federal, State, and local governments. Jim Lyons, USDA Under Secretary for Natural Resources and Environment, echoed many of the same challenges as the other speakers. He encouraged the participants to work together to ensure the next Farm Bill includes tools needed in addressing water quality and improving the health of the Great Lakes.

Diane Regas, Deputy Assistant Administrator for U.S. EPA, provided the keynote address at lunch. She said that one-third of the rivers and lakes in the U.S. are not meeting water quality standards today. She noted improvement as two-thirds of the rivers and lakes in the U.S. did not meet the fishable and swimmable criteria when the Water Quality Act was passed in 1972.

Concurrent Sessions - Focus of Discussion

- The value of open and natural spaces, including farms, forests and wetlands
- The advantages of urban and rural community partnerships to achieve mutual conservation goals, especially at the urban/rural interface
- The role of public and private investments in conservation of natural resources on private lands
- The critical role of natural resource sustainability on private lands for the region's well being
- The importance of the USDA conservation delivery system in achieving private land stewardship
- The importance of prime and unique soils and the designation of heritage soils

Concurrent Sessions

1- Agriculture Policy and the 2002 Farm Bill **page 10**

Presenters:

Craig Cox, Executive Vice President, Soil and Water
Conservation Society

Anne Simmons, Staff Member, House Agriculture Committee

2- Urban Conservation **page 12**

Presenters:

Kelly Burch, Chief, Office of Great Lakes, Department of
Environmental Protection, Pennsylvania

Kathy Evans, Water Quality Coordinator, Muskegon
Conservation District, Michigan

3- Fish and Wildlife Resources **page 13**

Presenters:

Paul Sandstrom, District Conservationist, USDA-NRCS,
Minnesota

Dr. Harold Webster, Associate Professor, Biology, Penn State
University, Pennsylvania

4- Watershed Approach **page 14**

Presenters:

Greg Lake, Executive Director, Allen County SWCD, Indiana
Mark Breederland, District Extension Agent, Michigan Sea
Grant, Michigan

Steve Olds, District Conservationist, USDA-NRCS, Michigan
David Lamm, Resource Conservationist, USDA-NRCS, Indiana

5- Production Agriculture **page 14**

Presenters:

Paula Smith, Stormwater Specialist, Monroe County SWCD,
New York

Steve Davis, Resource Conservationist, USDA-NRCS, Ohio

Concurrent Sessions, *Continued*

6- Farmland Preservation

page 15

Presenters:

Dr. Fred Miller, Professor, Soil Science, The Ohio State University, Ohio

Dr. Larry Libby, Professor, Rural-Urban Policy, The Ohio State University, Ohio

7- Water Quality and Agriculture

page 17

Presenters:

H. Merrill Loy, Owner, Simian Creek Farms, Minnesota

Dr. David Baker, Former Director, Water Quality Laboratory, Heidelberg College, Ohio

8- Water Quality & TMDLs

page 19

Presenters:

Trinka Mount, Water Quality Modeler, Ohio Environmental Protection Agency, Ohio

Ward Miller, Executive Director, Lake County Stormwater Management Commission, Illinois

9- Soil Carbon Sequestration

page 21

Presenters:

Dr. Rattan Lal, Professor, The Ohio State University, Ohio

William Richards, Farmer and Former Chief, USDA-SCS, Ohio

Agricultural Policy and the 2002 Farm Bill

Anne Simmons, House Agriculture Committee, discussed three components of developing agricultural policy. The first component was “pay as you go,” meaning that the budget request will have a significant impact on other spending. The amount of \$5.5 billion was allocated for Agricultural Market Transition Act (AMTA) spending in the farm bill and so far \$1.64 billion has been allocated which means that there is \$4 billion left for spending in 2002. There are many different groups competing for the same reserve of funding.

The second key component was “personalities.” In some cases, there have been problems passing bills due to differing personalities and the perception of agriculture. Many representatives don’t understand the importance of agriculture and this can lead to conflict. At certain times, partisan politics may enter into the scenario which prevents bills from being passed. She stated that Senator Lugar of Indiana added conservation provisions to the farm bill to get it passed.

The final component was “process.” The process of getting a bill introduced on the floor, through committee, and to a final vote can take a long time. Patience needs to be used in order to get legislation through the process.



“The key to successful implementation of conservation is that it needs to be locally led. Locals know their problems, and with a little help, they can fix those problems.”

Gary Mast, NACD Vice President

Craig Cox, SWCS, stated that there have been numerous farm bills, but the 1985 Farm Bill signaled a significant departure from the previous farm bills. The Sodbuster and Swampbuster clauses plus the conservation compliance provisions have reduced gross erosion rates by over 40 percent. The United States’ farm bills are the single most important piece of legislation for fish and wildlife concerns. Wildlife groups are well organized and have political clout in Washington, D. C.

Cox stated that the SWCS position on environmental legislation is to use sound science. In the past, good science has not been used on decisions. Right now the picture is somewhat cloudy on how this will be addressed. The administration needs to provide a balanced approach to the farm bill.

He stressed that the next farm bill needs to concentrate on getting dollars to farmers. The administration needs to work on the agenda now. The new administration may be slow to formulate recommendations without a base to work from and the legislators may not know the needs of farmers.

The issue of Confined Animal Feeding Operations (CAFOs) was discussed by the presenters and the audience. Approximately 95 percent of CAFOs needing conservation assistance will be on a voluntary basis while the other 5 percent will be nonvoluntary. The problem with this is the fact that U. S. EPA has been funded to carry out their responsibilities, but USDA has not been funded for their responsibilities in this endeavor.

“And recognizing the land as a valuable commodity, it also recognizes that economic and environmental considerations go hand in hand.”

*Richard Rominger, USDA
Deputy Secretary*

The topic of “green payments” was also discussed. This action would pay farmers who are implementing and maintaining an approved conservation plan. This practice would be a public investment in private lands, which is much cheaper than other alternatives. As long as there is a cheap food policy, this practice would be the least

expensive. The question was raised, “What will it take for this to happen?” The response was that it would be up to the budget committee to determine this, which will be dependent on tax cuts, spending priorities, and politics. The general public would need to be educated if this were to occur. USDA serves only about 2 percent of the population, and the general public and policy makers do not know what USDA does. USDA needs to publicize its activities and accomplishments to prove that it is responding to the needs of the general public.



Representative Kaptur added that the Budget Committee provides the overall spending limits to work from. Then the Committee assigns funding to the subcommittees. This past year USDA spending was up while funding for the Department of Interior was down. Congresswoman Kaptur also added that there are 25 to 30 congressional representatives that could support USDA. USDA needs to promote the 4-H program, farmer markets, and nontraditional programs such as urban greenhouses and to look beyond traditional constituencies.

Urban Conservation

Kelly Burch, Department of Environmental Protection, Pennsylvania, presented information on a specific project in Preque Isle adjacent to the city of Erie, Pennsylvania. Presque Isle is a seven mile long peninsula with a bay that is attractive to sensitive species. The main stream leading to the bay is Mill Creek. Due to a highly urban watershed (over 80 percent of the watershed), the creek has experienced severe water quality problems that have resulted in contamination of the bay from sediments carried from the stream. One source of pollution is from polycyclic hydrocarbons (PAHs) carried from impervious surfaces from vehicular traffic in the watershed. Waste also directly enters the creek from combined sewage overflows where storm and sanitary wastes become combined during storm events.

Evidence of pollution in the bay was found when many tumors were found on catfish samples in 1992.



...It's important we recognize that urban life, our urban landscapes, the economy of these areas, and the quality of life are inextricably linked to what happens in those rural centers...

*Jim Lyons
USDA Under Secretary for Natural Resources
and Environment*

"One of the greatest needs we have in the Great Lakes is to hear from a coordinated group of organizations and individuals who come to us with a clear agenda that we can implement."

*Marcy Kaptur,
Ohio Congresswoman*



Instead of a massive dredging process to remove sediments, other alternatives are being used. One hundred million dollars is being spent on a three facet approach to permanently resolve the problems. This involves eliminating the 52 areas where combined sanitary and storm sewers are found, doubling the capacity of the sewage treatment plant, and building stormwater retention areas.

Kathy Evans, Muskegon Conservation District, Michigan, began her presentation noting that of the 31 Areas of Concern (AOC) in the United States, that 14 are located in Michigan.

She noted the contaminated sediment problems associated with these sites. Community involvement included the use of the public to identify "hot spots." The State of Michigan has provided financial resources to address the AOCs. Remedial Action Plans (RAPs) are being developed and implemented, but now Federal funding cut-backs threaten progress.

Fish and Wildlife Resources

Paul Sandstrom, NRCS, presented three projects that he has been involved with as district conservationist. His area covers four counties and two Indian reservations. His basic premise was that habitat is the key to sustaining wildlife populations. All three projects were habitat restoration projects.



The first project was on the Fond Du Lac Indian Reservation. The goal was to restore the area for the natural production of wild rice. This area had been drained in the 1920s for crop production. The area was dominated by wild rice before this drainage. Crop production was never successful. In the 1990s, a management plan was developed to provide for the reestablishment of natural rice beds. These rice beds would then be harvested by Native Americans. The rice would be used as a food source for both humans and wildlife. The Minnesota wild rice is a critical food source for migrating ducks.

The second project was on the Knife River. Its purpose was to provide habitat for migrating steelhead trout. The Knife River is one of only a few rivers where the steelhead trout can swim up the waterfall leading from Lake Superior

into the river. The spring migration is essential for the fish to spawn and reproduce. There is a weir that the fish jump over and each fish is counted automatically. The number of trout going upstream and spawning has been declining rapidly. The Knife River Watershed Stewardship Committee was formed to address this problem. The committee identified the fishery resource problems, developed goals, and developed planned actions. They also developed a newsletter to keep people informed.

The third project involved the Miller Creek Watershed in Duluth. The watershed is entirely in an urban area. About 20 percent of the watershed is impervious area. However, it is a great area for brook trout. They received grants to fund restoration and research in this watershed. Their goal was to maintain and/or create a riparian forest area. Their proposed future actions include tree planting, salt and sand sweeping to keep road salt and sand out of the stream, protecting wetlands from development, and general habitat improvement. One of the interesting ideas being promoted was to keep dead woody vegetation in the stream to provide fishery habitat for the trout.

Sandstrom's conclusion was that restoring habitat was critical to wildlife. His goal is to teach landowners to manage landscapes to achieve this habitat restoration.

“...we can continue to expand our wildlife preserves, our important historic sites along this particular region, and eventually modernize the seaway system so tourists can come in here from around the world....”

Marcy Kaptur, OH Congresswoman

Watershed Approach



David Lamm, NRCS resource conservationist working with the St. Joseph River Watershed Initiative, began the session by discussing watershed issues in the St. Joseph's Watershed. He characterized the 694,000 acre watershed as being 79 percent agricultural with 120,000 acres in the Conservation Reserve Program (CRP). The drainage area serves as a water supply for the City of Fort Wayne, Indiana, and is located in three states. Major concerns include: pesticides, pathogens, sedimentation, nutrients, and aesthetics.

Mark Breederland, Extension Service district agent, and Steve Olds, NRCS district conservationist, discussed watershed issues and the watershed approach to planning in Michigan. Breederland said that watershed actions must address the environment, economy, history, and culture of the area. Olds discussed watershed planning techniques and methods to partner with others in a watershed.

Production Agriculture

Steve Davis, NRCS, presented information about the Ohio Lake Erie Buffer program. He cited that 22 organizations are involved in Ohio's program. Types of buffers include: grass waterways, filter strips, riparian forest buffers, windbreaks, and wetlands. Davis showed examples of these types of buffers and reviewed a strategic plan for the program's ten objectives.

A survey of farmers in the watershed was conducted and identified the following benefits of the program: reducing erosion, more efficient farming, wildlife habitat, protection of farmland, increases in plant and animal diversity, protection of wetlands, and improvement of fish spawning habitat.

Paula Smith, SWCD, outlined program objectives of the Monroe SWCD in the State of New York.

Farmland Preservation

Dr. Fred Miller, The Ohio State University, stated that the Great Lakes region is well-endowed with high quality and very productive ecosystems which are the basis of our agricultural and natural resource based economies. Abundant productive soils, water supplies, mineral resources, and transportation systems contribute to a productive economy and a high standard of living. This condition is not found in many other countries around the world. U.S. technologies have made our ecosystems even more productive.



The situation makes the Great Lakes region very fortunate, but also poses a dilemma for us. How do we continue to develop our natural resources in a manner which is sustainable, which does not degrade a high quality, productive ecosystem?

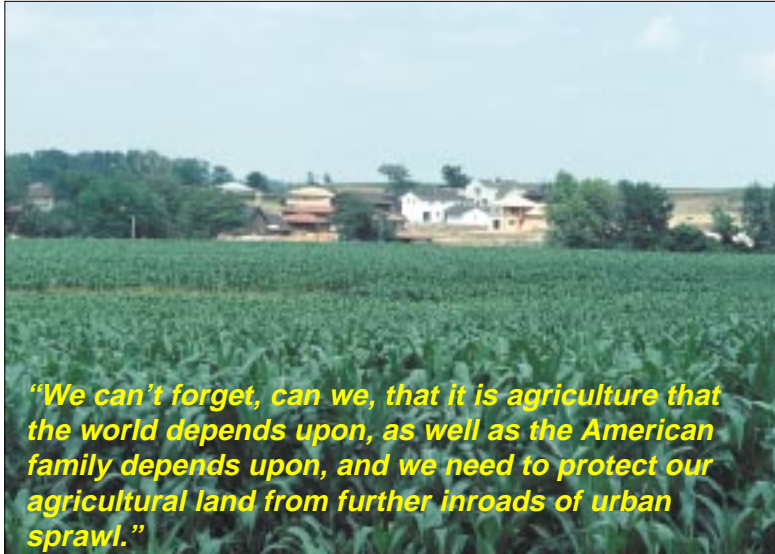
Miller noted the following trends in agriculture:

- Farm productivity has increased 250 percent over the past 50 years due to improvements in technology.
- Labor cost to produce a bushel of wheat from 1800 – 2000 went from 22 hours to less than 1 hour.
- Loss of farmland has come from transforming pasture, etc. to cropland, thus maintaining a more steady acreage of cropland, though prime farmland is being lost at a high rate.
- Technological advances have moderated the need to increase acreage to increase productivity.
- The stratification or the fracturing of large areas of agriculture into splintered areas is a more immediate problem than the acreage change itself.
- The loss of farms is also more of a problem than the loss of acreage. In Ohio from 1945-1997, farms dropped from 220,000 to 68,000. Ohio is losing 360 farms per year or about 1 farm per day.

Farmland Preservation, *Continued*

Dr. Larry Libby, Ohio State University, concentrated his discussion on policy questions on farmland preservation. He stated that most people perceive the importance of farmland preservation in terms of protecting the country's long-term food security. He also stated that we need to be more aware of the natural resource "services" which farmland provides society, i.e. groundwater recharge, nutrient recycling, and wildlife habitat. In some instances, farmland preservation can offer a reduced cost to develop, even though rural development actually does not pay as much in taxes as it costs in public services to support it.

Libby then outlined policy methods that can be used to help preserve farmland. He noted regulations such as zoning for agriculture and subdivision acreage regulations. Taxing was also discussed as a tool. This included limiting taxes to a percent of agricultural income and taxing as land is used, not upon its potential.



"We can't forget, can we, that it is agriculture that the world depends upon, as well as the American family depends upon, and we need to protect our agricultural land from further inroads of urban sprawl."

Carleton Finkbeiner, Mayor, Toledo, OH

The use of purchase of development rights (PDRs) in the Great Lakes region was also discussed, including State funding of this mechanism. In summary, the use of these tools was the refinement of existing laws and rules. Libby noted that regional cooperation among the many jurisdictions is vital to the success of creating workable rules to protect farmland.

Water Quality and Agriculture

Mr. Merrill Loy, SWCD, began the session by stating that the problems associated with water quality degradation, as related to agriculture, are fairly traditional. Sediments lost from excessively tilled agricultural land are well recognized as a major contributor to water quality. Soil lost from eroding stream banks due to channel orientation, high flow rates, unstable soils, and the influences of free ranging cattle cause alarming contributions of sediment to surface water.

Eroding sediments, in addition, also serve as a primary vehicle for nutrient delivery to and destruction of surface water as well. Inadequate or improper storage of animal waste products can yield some stream segments virtually impassable due to excessive water-borne vegetation due to excessive nutrient loading.

Effective strategies to address cited concerns are available. The lack of adequate incentives and availability of technical assistance tends to contribute to lack of best management practice application. Technology use, such as Geographic Information Systems (GIS), can be used to analyze and identify regions for targeting financial and technical assistance. Still, additional funding for application of best management practices and technical assistance is required to adequately address water quality concerns in Minnesota.

Dr. David Baker, Heidelberg College, retired, began his presentation by pointing out that the major contributors to water quality degradation in the Great Lakes are the nutrients nitrogen and phosphorus. Each respective nutrient has a differing host for delivery to the Great Lakes. Nitrogen, a water-soluble nutrient, is traditionally used for corn production in the Great Lakes drainage basin. Unused nitrogen will leach through the soil



profile and ultimately reach either ground water sources or be intercepted by a subsurface drainage system. These drainage systems outlet into surface drainage ditches and ultimately into the Great Lakes. Phosphorus is delivered primarily to surface water bodies attached to sediments eroded from agricultural fields. Agriculture is a major contributor of phosphorus to Lake Erie and the other Great Lakes with 77 percent of total phosphorus loading originating from applied fertilizer and 22 percent from animal manures.

Water Quality and Agriculture, *Continued*

Baker also pointed out that stream dynamics, seasonal variations, and significant storm events play a substantial role in nutrient loading. Smaller streams generally tend to be greater contributors of nutrients, by concentration, than larger streams. Respectively, nutrient application generally occurs in spring months and thus can contribute to higher losses, by concentration, than summer months. Research indicates that the bulk of phosphorus loading occurs during the winter months when there is no plant uptake of phosphorus or soil moisture. Analysis of subsurface tile drainage water reveals respectable amounts of clay particles and nitrates.

Baker stated that at times Lake Erie's water is unsafe to drink. Nitrates exceed the Ohio EPA safe drinking water standards 6 to 8 percent of the time in the Maumee and Sandusky Rivers and watersheds. Research indicates concentrations of pesticides used in agricultural commodity production are seasonal in nature and more of a chronic problem than a critical problem. Equally, elevated bacterial levels are more prominent at high flow conditions. Water quality is generally acceptable for recreational use.

Best management practice implementation has accelerated in recent years and has had a predicted improvement effect within the Lake Erie watershed and contributing surface water bodies. Practices that have increased residue levels on cropland have reduced soil loss and subsequent phosphorus delivery. Also, an overall reduction in the application of commercial phosphorus helped, as well, reduce gross phosphorus loading from cropland to surface water. The implementation of riparian buffers is predicted to have a significant positive effect on surface water quality and phosphorus levels.

Overall long-term watershed and land management policy should be directed to increasing riparian buffers and maintaining or increasing crop residue management. Educational and programmatic incentives may be directed to reducing excessive phosphorus levels consistent with tri-state fertility recommendations. Equally, additional research is warranted for determining best management practices to reduce nitrate loss and loading of surface water from agricultural sources.

"I think we're finally going to fully appreciate the connection between land use and water quality. We have come to realize that the origin of, and the ultimate answer to, so many of our environmental problems is found on land and not in water."

Michael Donahue, Executive Director, Great Lakes Commission

Water Quality and Total Maximum Daily Loads (TMDLs)

Trinka Mount, Ohio EPA, reported that in Ohio, TMDLs are presently a new area of growth and activity. The TMDL concept came from the Clean Water Act (CWA) and she defined it as “the maximum amount of pollution a water body can contain and still meet water quality standards.” With respect to TMDLs, the CWA requires States, through Section 303d, to first list and prioritize impaired waters, and secondly to prepare a written assessment with recommendations for improvement.

In Ohio, 881 of 5,000 stream segments are listed as impaired; and 276 of 326 watersheds contain at least 1 impaired segment.

The 15-year schedule to implement the TMDL program will begin slowly, then increase. Currently, Ohio EPA is initiating 4 TMDL efforts per year within 10 to 12 watersheds. This will jump to 8 per year starting in 2004.

To picture the TMDL concept, Mount stated we need to think in terms of a holistic approach, a watershed focus, and a process that accounts for all pollution sources. She then reviewed the 12-step process used in Ohio for determining where and how TMDLs will be used and the process for “delisting” and “relisting” impaired segments and/or watersheds. Themes in the entire effort should include partnering, public participation, and a quality improvement process.



Mount then showed a map of Ohio indicating the locations of the 13 TMDL areas in progress. She stated that Ohio EPA would be working toward full implementation and gaining input from the External Advisory Group by June 2000. She noted that there was some current controversy on how animal agriculture might be regulated or permitted. She stated that SWCDs would probably be involved in working with farmers to decide where best management practices should be applied if TMDLs are exceeded from nonpoint sources in an agricultural watershed. She went on to state that citizen groups and other agencies would need to help with the job of monitoring.

Water Quality and TMDLs, *Continued*

Ward Miller, who coordinates the Lake County, Illinois, Stormwater Management Commission (SMC), said that the most important item to remember from his presentation was that “local units of government are the key to the success of any stormwater management program.” Lake County, which lies between Chicago and the Wisconsin border, has over 90 units of government. The SMC functions much like a regional planning commission. The emphasis to begin the SMC came from the severe damage caused by the 1993 flood. Homes are taxed to help fund the SMC. Miller noted changes to their planning approach which have resulted in greater successes and accomplishments. One

of the changes was a decrease in the top down approach and changing from reacting to flood events to flood mitigation planning.

Miller then reviewed current SMC water quality initiatives. The SMC goal is to be proactive because of suspected TMDL impacts. In Illinois, there are 741 impaired stream segments within 336 watersheds. He feels it may be difficult for the State to achieve all the TMDL goals within the timeframe. However, the Clean Water Action Plan is providing \$2.3 billion in new funds over the next 5 years to focus on Private Land Stewardship Incentives.



“...on a watershed-by-watershed basis across the country, we need to make sure we’ve got strong standards in place, we have good local partnership-based programs in place to meet those standards, and that we implement those programs.”

Diane Regas, EPA Deputy Assistant Administrator

Soil Carbon Sequestration

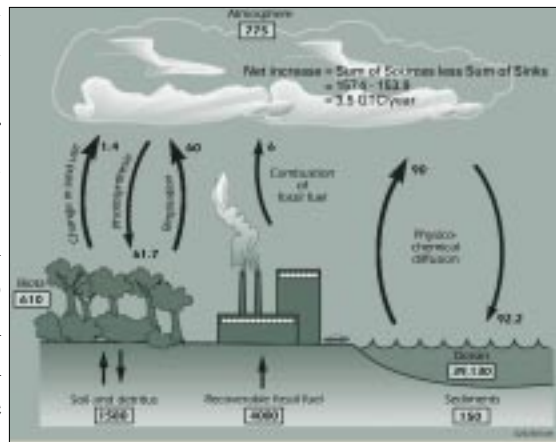
Dr. Rattan Lal, The Ohio State University, began the session by stating that the global population of 6 billion is increasing at the rate of 1.3 percent or 73 million persons/ year. At the present rate of growth, the population will reach 7.5 billion by 2020 and 9.4 billion by 2050. With the projected increase in world population, the future food demand for cereals will increase by 39 percent between 1995 and 2020 to reach 2,466 million tons and demand for roots and tubers will increase by 37 percent to reach 864 million tons.

Therefore, among principal global concerns of the 21st century are: 1) food security due to a rapid increase in the world population, 2) soil degradation by land misuse and soil mismanagement, and 3) anthropogenic increases in atmospheric greenhouse gases. All of these issues are linked to the sustainability of soil quality especially in relation to the soil organic carbon (SOC) pool and its dynamics.

Soil supports terrestrial life through five processes: 1) bio-mass productivity; 2) restoration and resilience of ecosystems; 3) purification of water; 4) detoxification of pollutants; and 5) cycling of C, N, P, S and H₂O. These processes are affected by the quality and quantity of the soil organic carbon pool. However, the soil organic carbon pool of agricultural soils has been depleted

by 30 to 40 Mg C/ha (Mg = 1 metric ton, 1 hectare = 2.47 acres) due to cultivation and other degradative processes, which has set-in-motion the downward spiral of soil degradation.

The increase in atmospheric concentration of CO₂ is occurring at the rate of 3.4 billion tons



of 3.4 billion tons pico grams (PG)/year. In addition to fossil fuel combustion and cement manufacture, this increase is caused by deforestation, biomass burning, and soil cultivation. Conversion of natural to agricultural ecosystems has resulted in emissions of 66 to 90 pico grams of carbon from world soils. The rate and magnitude of gaseous emissions from world soils are exacerbated by soil degradative processes, e.g., decline in soil structure, accelerated erosion, and nutrient imbalance. Until the 1970s, more carbon was emitted annually from soils and land use conversion from fossil fuel combustion. Presently, about 25 percent of global emissions are from all agricultural activities. Judicious land use and recommended soil management techniques can re-sequester 60 to 70 percent of the historic carbon loss.

Adoption of recommended agricultural practices or agricultural intensification can improve productivity and re-sequester carbon lost from world soils. In the past 50 years, the number of people fed by a single U.S. farmer has increased from 19 to 129 through adoption of rec-

Soil Carbon Sequestration, *Continued*

ommended agricultural practices. Such practices include the use of conservation tillage; growing cover crops; using bio-solids and amendments; enhancing soil fertility through judicious use of fertilizers and adopting precision farming; water conservation and improved methods of irrigation; and use of improved varieties. The global potential of soil carbon sequestration through potential is estimated at 0.9 to 1.9 pg/yr through desertification control and about 3/year through restoration of all degraded soils. Soil carbon sequestration is a win-win adoption of improved agricultural practices with potential of 40 to 70 pico grams over a 50-year period. This potential is over and above that in rangeland/pasture soils, forest ecosystem, and biofuel production. In addition, it is important that degraded soils and ecosystems be restored. The soil carbon strategy: 1) increases agricultural productivity; 2) improves water and air quality; and 3) reduces the rate of enrichment of atmospheric CO₂.

Lal concluded by pointing out that as the world population continues to grow, available farmland shrinks and the emission of gases in the atmosphere increases. Nonetheless, world soils have the capacity to feed the present and future population provided that soils are used, improved, and restored. As has been the case in the past, those holding neo-Malthusian views will again be proven wrong through adoption of recommended agricultural practices for sustainable management of soil resources. Contrary to the misconception, adoption of recommended agricultural practices is a solution to the

environmental issues and also to achieving global food security.

William Richards, former NRCS Chief, stated that conservation tillage is the key to erosion control and carbon sequestration. Conservation tillage is competitive and profitable on the farm, peaking at 40 percent of the planted acres as a result of the 1985 Farm Bill. We have seen a decline in conservation tillage acres with corn while overall we have been passed by Argentina and Brazil.

Conservation programs to be effective need to be separate from other programs, use a volunteer approach, and be incentive based. A conservation bill separate from the 2002 Farm Bill could have carbon sequestration in it and would place dollars out to the countryside when and where needed. Conservation can be sold under the banner of carbon sequestration. We need to be cautious of the amount of acres that go into long-term Conservation Reserve Program (CRP) acres or we could export our production as well as increase world environmental problems.

Carbon sequestration offers many benefits to agriculture, as carbon increases in the soil so does production. The Agricultural Research Service (ARS) has shown that with no-tillage you can raise the soil carbon content 2 percent in 10 to 20 years, resulting in a 20 bu./acre increase in corn yield. The worth of carbon to the land and soil is \$500/acre.

In conclusion, Richards said that farmers need to grow grain and carbon with conservation tillage and get all the benefits.

Conclusion

The Great Lakes 2000 Symposium increased the awareness of a number of complex issues affecting the ecosystem health of the Great Lakes region. The symposium, undoubtedly, will act as a springboard for the use of sound science in future legislative and policy development exercises.

Some of the topics and conclusions from discussions and presentations at the symposium sessions included:

- The value of open and natural spaces, including farms, forests and wetlands;
- The advantages of urban and rural community partnerships to achieve mutual conservation goals;
- The role of public and private investments in conservation of natural resources on private lands;
- The critical role of natural resource sustainability on private lands for the well being of the Great Lakes region;
- The importance of the USDA conservation delivery system in achieving private land stewardship; and
- The importance of prime and unique soils and the designation of heritage soils.

In closing, Congresswoman Kaptur encouraged the participants to “make no small plans,” and to “do something worthy in our day and generation.” She reiterated the message for a unified and coordinated group from the Great Lakes region to deliver a common agenda with a clear and concise message to those that serve in the legislative arena.

“The Farm Bill brought together all of the parts for a healthy landscape, environmental benefits that include not just soil conservation, but protection of wildlife habitat and the health of the rivers and streams.”

Richard Rominger, USDA Deputy Secretary

Presenter Reference

Dr. David Baker
374 Riverside Drive
Tiffin, Ohio 44883

Mr. Mark Breederland
District Extension Agent
Michigan Sea Grant Extension
200 Grand River, Suite 102
Port Huron, Michigan 48060

Mr. Kelly Burch
Chief, Office of the Great Lakes
Penns. Dept. of Environmental
Protection
Northwest Regional Office
230 Chestnut Street
Meadville, Pennsylvania 16335

Mr. Craig Cox
Executive Vice President
Soil and Water Conservation
Society
7515 NE Ankeny Road
Ankeny, Iowa 50021-9764

Mr. Steve Davis
Natural Resources
Conservation Service
3900 Campus Drive, Suite A
Lima, Ohio 45804

Ms. Kathy Evans
Water Quality Coordinator
Muskegon Conservation
District
1001 East Wesley, Room 6
Muskegon, Michigan 49442

Mr. Greg Lake
Executive Director
Allen County SWCD
2010 Inwood Drive
Ft. Wayne, Indiana 46815

Dr. Rattan Lal
Ohio State University
School of Natural Resources
2021 Coffey Road
Columbus, Ohio 43210

Mr. David Lamm
Resource Conservationist
Natural Resources
Conservation Service
Executive Park
2010 Inwood Drive, Suite 103
Ft. Wayne, Indiana 46815

Dr. Lawrence W. Libby
Department of Agriculture,
Environmental and
Development Economics
Ohio State University
2120 Fyffe Road
Columbus, Ohio 43210-1067

Mr. H. Merrill Loy
Simian Creek Farms
2809 Simian Creek Drive
Cloquet, Minnesota 55720

Dr. Fred Miller
The Ohio State University
School of Natural Resources
2021 Coffey Road
Columbus, Ohio 43210

Mr. Ward Miller
Executive Director
Storm Water Management
Commission
333-B Peterson Road
Libertyville, Illinois 60048

Ms. Trinka Mount
Division of Surface Water
Ohio Environmental Protection
Agency
Lazarus Government Center
P.O. Box 1049
Columbus, Ohio 43216-1049

Mr. Steve Olds
District Conservationist
Natural Resources
Conservation Service
7203 Jackson Road
Ann Arbor, Michigan 48103

Mr. William J. Richards
Richard Farms, Inc
24537 Canal Road
Circleville, Ohio 43113

Mr. Paul Sandstrom
District Conservationist
Natural Resources
Conservation Service
4850 Miller Trunk Hwy
Suite 2-B
Duluth, Minnesota 55811

Ms. Anne Simmons, Consultant
House Committee on
Agriculture
General Farm Commodities,
Resource
Conservation and Credit
Subcommittee
1002 Longworth HOB
Washington, D.C. 20515

Ms. Paula Smith
Stormwater Specialist
Farm and Home Specialist
Monroe SWCD
249 Highland Avenue
Rochester, New York 14620

Dr. Harold J. Webster
Pennsylvania State University
DuBois Campus College Place
DuBois, Pennsylvania 15801