

Great Lakes Nonpoint Source Workshop: A Post PLUARG Review  
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**SEDIMENT**

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**BACKGROUND REFLECTIONS**

When I agreed to accept this assignment I realized I had been away from the Great Lakes community for more than seven years, approaching a decade or nearly 50 years in a dog's life. The next recollection was to try and relate what has happened since PLUARG. Now that requires a look back of more than a quarter century. I became involved in Great Lakes nonpoint source water quality issues in the late 70's and early 80's. Nonpoint source wasn't even an accepted term at that point. No one was confident they really knew what was causing the eutrophication of Lake Erie but there were a lot of ideas and the beginnings of a lot of new cutting edge monitoring and research going on. Honey Creek pilot project, Maumee Basin, Toledo Harbor, River Rouge, Saginaw Bay, Green Bay and others all were experiencing water quality problems related to more than just "point" sources. How could the Great Lakes community get their arms around such an issue? It wasn't something you could pinpoint a single or distinct culprit, you couldn't run to a discharge pipe and grab a sample and say ahah! I know where it's coming from. This overview will concentrate on the single largest pollutant by volume entering the Great Lakes and that is **SEDIMENT**. That's right, displaced dirt, topsoil that has strayed from its home, mud when its mixed with too much water, and nutrients and pesticides that all hitch a free ride to the wild blue yonder known as the Great Lakes.

**SOURCES AND PATHWAYS**

What have we learned in the last 25 years about the transport of sediment? We know it all starts with a drop of water, or rather a lot of drops of water, especially when they're fast and furious, the energy dislodges the soil and it begins its travel in bumps and starts through the hydraulic delivery system from the farm field to the harbors. Small storms prime the system and large storms deliver the payloads to the harbors, discharging thousands of tons of sediment in a single event into the harbors and beyond.

Research has pretty well defined the pathways and routes of travel with detailed edge of field studies in the 70's and 80's to the gauging stations manned by Heidelberg Water Quality lab and USGS continuing well into the 90's. Some questioned the validity of the early results coming from Dr. Dave Baker's Lab and dedicated crew but gradually the facts made sense, year to year variations were enormous depending on the weather patterns which emphasized the importance of long term studies to ferret out the trends and changes that were occurring in the watersheds. Recent reports published by Dr. Pete Richards and the USGS NAWQA Report show that changes to the landscape do have

long term and “measureable” effects on sediment transport. In the Maumee Basin conservation tillage that reached levels of 50% of the cropland acres of corn and soybeans during the early and mid 90’s reduced sediment at Waterville by 11.2 %, and further upstream closer to the source a reduction of 49.8% was noted for the Auglaize River watershed.

### **DAMAGES AND IMPACTS**

Once the sediment gets into the stream delivery system what harm does it do? If humans were not in the equation probably no one would care, but the damages sediment causes, begin at the source in the farmer’s field or on the construction site. There is a loss of productivity for agricultural crops, a less efficient hydraulic transport system, a reduction of in-stream habitat for the benthic invertebrates and spawning sites for certain fish, a loss of capacity or “draft” for cargo ships and pleasure boats at the harbors.

These losses require societies’ economic capital in tax dollars to address the problems and lessen the effects. Some are mere band-aids, like dredging, while others can have long lasting positive effects when they change behavior and the way society does things such as the adoption of conservation tillage. Dredging in Lake Michigan and Superior for the top 32 harbors since as early as 1957 has moved more than 115.6 million cubic yards at an actual cost of \$271,220,000 not adjusted for inflation. In the last five years costs have risen to more than \$15.00 per cubic yard in some places. Toledo Harbor at the Maumee River leads all of the dredging in the Great Lakes with an average of 800,000 cubic yards annually at a cost of \$2.2 million. We are running out of places to dump it.

### **IMPLEMENTATION TOOLS AND BMP’S**

A number of programs have been directed at reducing sediment transport to the rivers and streams of the Great Lakes such as in Saginaw Bay, Michigan, Maumee Bay, Ohio and Green Bay, Wisconsin. Their main thrust was to convince farmers and rural landowners that every effort was important to keep soil from leaving their home sites. The concept of a “T” value based on long term productivity wasn’t really valid for many of these locations. The Maumee River watershed with its several million acres of cropland on flat landscapes could meet the “T” requirement with fall plowing, but this isn’t acceptable as a long term goal. The goal is based on the long term geologic erosion rate or a water quality “T” value of 0.5 Tons per acre. This made a lot of professionals and farmers take a new attitude about what could be accomplished, some are still not convinced it’s achievable. Conservation tillage was an acceptable shift and no-till was about as good as technically feasible for continuous cropland. Emphasis through the US EPA, GLNPO, USDA and the state agencies as well as Ontario, Canada saw the adoption of the new farming practices grow dramatically through the 80’s and early 90’s. Annual transects showed more than 50% adoption of conservation tillage in the Maumee Basin. A decrease in emphasis during the last decade and a lack of research to address technical problems has seen a stagnation of numbers in the Great Lakes Basin.

## **DATA AND INFORMATION**

In order to measure any significant changes, long term studies were initiated in the Maumee Basin principally through the Heidelberg Water Quality lab during the 80's and 90's. USGS conducted a series of studies from 1996 thru 1998 as part of the St. Clair and Lake Erie NAWQA study which looked at a number of nonpoint pollutant items in addition to sediment including pesticides, heavy metals and other carcinogenic compounds. Both sources concluded that increased residue on the landscape prevented dislodging soil from the surface and in turn reduced sediment transport in the stream system. Results show a reduction of 10 to 15% during the time period from 1976 to 2001. Another program that was introduced in the Lake Erie Basin was the Buffer strips for conservation. These emerald ribbons of riparian timber and wildlife habitat were promoted to trap the sediment before it reached the delivery system. Begun in 1998-99 the goal was to install 50,000 acres in 5 years. The final report in March of 2004 shows that 44,000 acres were enrolled in the program. Their effectiveness was positive as a visual reminder to farmers and others that the streams are important parts of the landscape that need to be protected. Their effectiveness in trapping sediment is still not clearly understood.

## **PROGRAMS, POLICIES AND REGULATIONS**

Programs have come and gone in the Great Lakes Basin to address sediment and the associated pollutants that hitch a ride when it is dislodged from the landscape. A major phosphorus reduction strategy was developed in the 80's that focused on reducing sediment transport as the main cog in solving the nutrient transport. A lot of money and effort went into promoting changes in the culture of keeping residue on the landscape. It was "measureably" successful in accomplishing its intended goal. But as life has it, the zebra mussel arrived and bingo the lakes cleared up almost overnight. In fact, they are so clear that there is talk of seeding phosphorus to add more algae to the water column for food. I would hope that this remains only in the talking stages and never becomes a reality. Is society happy and content with the status quo? Is the dredging program for more than 50 harbors a necessary price to pay for the cost of doing business or are there ways to continue to improve the cover conditions and reduce the long term transport of sediment to the streams, rivers, harbors and Great Lakes?

That is the question posed to you today. Your ideas and input will shape the direction for policies and programs in the future.