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Annis Water Resources Institute

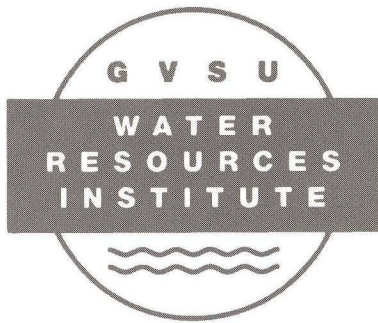
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Review

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WRI Launches The *W.G. Jackson*

This past June, the Water Resources Institute (WRI) christened its second vessel dedicated to community education and water research. The 65-foot ship — the *W.G. Jackson* — is named for Muskegon businessman and environmentalist William G. Jackson who provided a \$250,000 challenge grant to initiate the fund-raising campaign. The Muskegon-based *W.G. Jackson* joins the 45-foot *D.J. Angus*, docked in Grand Haven, as part of WRI's Outreach Education Program, which offers unique learning experiences for west Michigan student groups from grade school to college.

"It's an outstanding program that has exceeded the capabilities of the *D.J. Angus*," said Ron Ward, Director of GVSU's Water Resources Institute. "We had 5,000 people on 231 cruises last year; we really knocked ourselves out. We've seen the program grow year after year, and we knew that Muskegon wanted a GVSU presence on their waterfront."

For the past few years, the Muskegon County area has undertaken a major revitalization campaign. The community has spent millions transforming an environmentally ravaged industrial

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The W.G. Jackson plies the waters of Muskegon Lake on its mission of research and education.



Aquatic Education: Reaching Out To Diverse Groups

Recent months have been busy for the Water Resources Outreach Education Program which reaches students, teachers, and the community. A science activity day was held on July 17th at the Consumers Power Biological Station at West Olive. Involved groups included WRI, GVSU TRIO Upward Bound, and the Muskegon Heights Elementary grades summer school program. WRI science instructor, Gus Unseld, organized the event. Upward Bound helps young people and adults prepare for higher education. A five week session at the GVSU campus enabled Upward Bound students to demonstrate and supervise the hands-on learning of 32 Muskegon Heights fourth, fifth, and sixth grade students.

The hands-on projects involved:

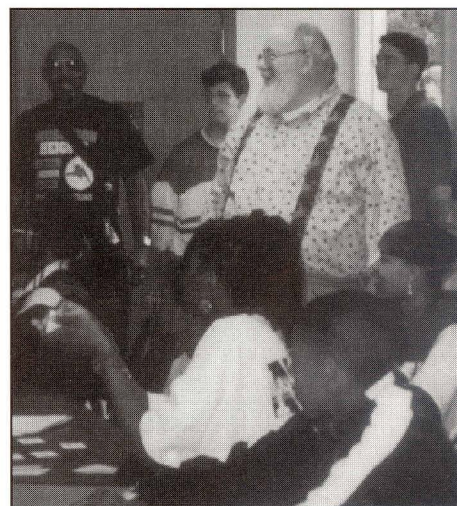
- testing surface tension - a bubbles and glycerin exercise;
- modeling the Great Lakes with

secchi disks (a devise which measures water clarity);

- learning to use an identification key for fish; and
- learning about groundwater and its capacity to dissolve materials by making a pop bottle model and measuring conductivity of water.

Both sets of students, the adult supervisors, and the leaders of the Biological Station called the morning's activity a success. WRI is working with Consumer's Power to provide more opportunities for "on land" activities to supplement the outreach education program.

Dr. Loretta Konecki's Elementary Science Methods and Materials class was one of the first groups to use the new *W.G. Jackson*. The students — all teachers or future teachers — tied in their vessel cruise to concepts of experiential learning. The hands-on science component of their experi-



WRI science instructor Gus Unseld talks to a group of Upward Bound students in Muskegon.

ence brought together science concepts and made them "real." According to one participant, "If any teacher were to ask me how beneficial I thought taking a group of children out on the *Jackson* really is, I would show how many of the science objectives the experience fulfills, or I could list all of the real-life, hands-on investigations the students will perform, or I could simply say, 'Do it! The kids will love it!'"

Linda Humphreys, the new Environmental Education Coordinator for the Michigan Department of Environmental Quality, visited the *W.G. Jackson* with an Envirothon planning group. The Envirothon is similar to the Science Olympiad, but its focus is environmental science. There are plans for the national competition to be held in Michigan in 1998. Both the *D.J. Angus* and *W.G. Jackson* will be utilized in competition events.

To find out more about the Water Resources Outreach Education Program, call WRI at (616) 895-3749.



*WRI science instructor Chuck Vanderlaan (in photo far right) works with a group of teachers and future teachers from Dr. Loretta Konecki's Elementary Science Methods and Materials class aboard the *W.G. Jackson*.*

PCB Research Project Assesses Fish Behavior

PCBs are widespread contaminants in water, air, and soil. They can constitute a major health risk to fish and animal life at concentrations below 1 ng/g. Lightly chlorinated ortho-substituted PCB congeners, or compounds, have been demonstrated to induce neurotoxicity by epidemiological studies and animal tests in the laboratory. However, there is no congener specific kinetic data currently available on aquatic species. In fact, since aquatic species are an important food source, their contamination may suggest a significant health problem for other animal species and even humans. There is a need to integrate information about the neurotoxicology of



PCBs which are present in aquatic environments.

This past summer Dr. Min Qi, a research associate of WRI, and chemistry undergraduate Anthony Boyd initiated a new research project: "Assessment of PCB Congeners, Their Uptake, Bioaccumulation, and Neurotoxicity in Fish."

They purchased goldfish from a fishery and conducted several exposure studies along with controlled goldfish in the newly established aquaria. By using Gas Chromatograph and Gas Chromatograph-Mass Spectrometer they could determine the concentration of PCB congeners in fish brains and tissues. Then they evaluated the distribution and accumulation of PCB congeners in the fish. Preliminary results indicated that the behavior changes of fish were associated with the different amount of PCBs dosed. The team plans to collaborate with Dr. Xandra Xu in the Psychology Department of Grand Valley State University to further study neurological effects of those PCB congeners on goldfish.

Sediments Examined For Contamination

NOAA And WRI To Collaborate On EPA Funded Investigation Of Sediment Contamination And Toxicity In White Lake

The extent and toxicity of sediment contamination in White Lake will be investigated through a research grant from the Great Lakes National Program Office of the Environmental Protection Agency. Historical industrial discharges of heavy metals have made an impact on the sediments from White Lake. Sediments in one section of the Lake contain some of the highest levels of chromium detected in the Great Lakes region. This investigation will determine the nature and extent of sediment contamination in addition to evaluating its effect on the aquatic environment.

The project will involve collaboration between researchers from the National Oceanic and Atmospheric Administration (NOAA), Water Resources

Institute (WRI), the University of Michigan, and the University of Florida. Dr. Gary Fahnenstiel of NOAA's Great Lakes Environmental Research Laboratory in Muskegon, Michigan, will serve as the Principal Investigator for the project. WRI scientists, Dr. Richard Rediske and Alexey Stiop, along with three student research assistants will conduct the sediment chemistry analysis which will include heavy metals, selected organic compounds, grain size, and total organic carbon. The project will also involve radiochemical dating of sediment cores by Dr. Claire Schelske of the University of Florida to determine the deposition rate of chromium and the stability of the strata. Dr. Peter Meier of the University of Michigan will perform the sediment toxicity evaluations.

NOAA and WRI will also collaborate on the use of mesocosms to evaluate the biological uptake of mercury in fish and benthic organisms. Mesocosms are large enclosures which isolate an area of contaminated sediment and the surrounding water column. Mesocosms have historically been used in the evaluation of population dynamics in aquatic ecology. This project represents one of the first applications for mesocosms in the evaluation of sediment toxicity and biological uptake.

Sediment collections are scheduled to begin in October 1996. Project completion is planned for December 1997.

Environmental Issues Highlighted In Forums

The Water Resources Institute (WRI) recently hosted the Lake Michigan Forum for their quarterly meeting held in Grand Haven. The Forum and a technical coordinating committee of state and federal agency representatives provided input to the development of the Lake Michigan Lakewide Management Plan (LaMP). The United States Environmental Protection Agency (EPA) under the Great Lakes

Water Quality Agreement is taking the lead in developing the Lake Michigan Plan to restore and protect the lake.

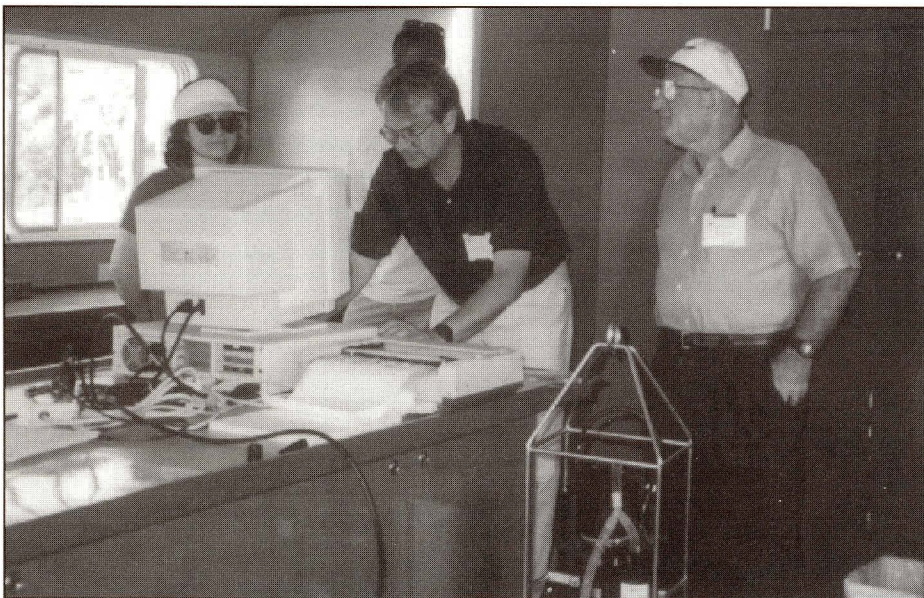
Judy Beck of Region 5 EPA brought the EPA Lake Michigan Team to Grand Haven to meet with representatives from the Michigan Department of Environmental Quality (DEQ) as well as other state agencies. Janet Vail of WRI is a member of the

Lake Michigan Forum which includes stakeholder groups from throughout the Lake Michigan basin.

As part of their visit, the group cruised on the *D.J. Angus* and *W.G. Jackson*, Grand Valley State University's research vessels.

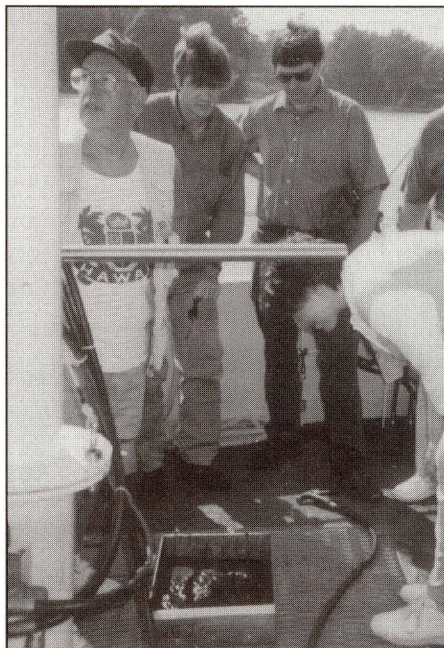
A public meeting was held in conjunction with the Forum. Over 85 people voiced their concerns about the lake and interacted with EPA, DEQ, and Forum members. Tanya Cabala of the White Lake Area of Concern (AOC), Al Bell from the Muskegon Lake AOC, and Roger Eberhardt representing the Kalamazoo River AOC provided updates on activities in these areas. John Koches of WRI discussed the WRI Decision Support Systems. Rick Rediske of WRI presented an update on WRI biomediation research as well as sediment sampling projects.

WRI also helped plan the public forum on ground-level ozone held on August 14. Members of the Clean Air Coalition (CAC), which include representatives from business, industry, academic, state and local agencies, and non profit organizations, addressed what the public can do about west Michigan's ozone problem. They sponsor the "Ozone Action Day" program which alerts our area to conditions where excessive ozone formation may be a problem. Karen Molenda of the Grand Valley Metropolitan Council coordinates the program. To reach the local ozone hotline, call 1-800-65-OZONE. You may also access information through Internet. Updates are found at the DEQ, Ozone Homepage (<http://aqd.deq.state.mi.us/pages/03action.htm>).



In photo above: WRI researcher Dr. Rick Rediske analyzes data from the Sea Bird profiler, a water testing instrument, on the Lake Michigan Forum cruise.

In photo right: Members of the Lake Michigan Forum examine a sample of sludge taken from Lake Michigan. Pictured from left to right are Chuck Vanderlaan, the science instructor on the W.G. Jackson, Tim Brown from Clean Sites, Roger Eberhardt from the Michigan Department of Environmental Quality, and Maxine Appleby, Forum co-chair.



Growing Up

Sustainable Development Conference Explores Urban And Suburban Growth Issues

On June 13, 1996, the Third Annual Sustainable Development Conference — **Growing Communities and Quality of Life** — attracted more than 225 people to the Crowne Plaza in Grand Rapids. Funded in part by the Frey Foundation and coordinated by WRI, the conference focused on local urban growth issues and various management methods for both urban and rural communities.

A majority of conference participants were local officials from Kent, Ottawa, and Muskegon counties. It was sponsored by the Partnership For Sustainable Development, of which WRI is a member. Other members include: West Michigan Environmental Action Council; Natural Areas Conservancy of West Michigan; Grand Valley Metro Council; Greater Grand Rapids Home Builders Association; Grand Rapids Area Transit Authority; Fishbeck, Thompson, Carr & Huber; and Earth Tech.

Featured that day were nationally recognized speakers who have taken steps in their own growing communities to preserve the quality of life. Among them was Peter Katz, acting Executive Director of the Congress of New Urbanism, San Francisco, California, who highlighted the need to integrate modern urban and suburban life into compact, pedestrian-friendly communities.

Tom Daniels, Director of the Agricultural Preserve Board in Lancaster Pennsylvania, discussed the nationally recognized Purchase of Development Rights Program he administers for Lancaster County. He has been involved in preserving 11,500 acres of



More than 225 people attended the third annual conference in Grand Rapids on urban and suburban development entitled "Growing Communities and Quality of Life" to hear experts give advice on managing growth.

prime farmland in his region. Jeff Lacy, Chief Environmental Planner for the Metropolitan District

Commission in Belchertown, Massachusetts, in a presentation titled "The Price of Open Space," compared the market appreciation of homes in an open space development to those in a conventional suburban development.

Terry Moore, Vice President and Project Manager of ECONorthwest, Portland, Oregon, educated the conference participants on what works and what doesn't in setting up a Metropolitan Growth Management Plan based on his experiences in Portland.

The conference also featured many speakers from around Michigan including Mark Wyckoff, President of the Planning and Zoning Center, Keith Charters, implementor of the Grand Traverse Bay Region Growth Management Guide Book, and Representative Bill Bobier, of District 101.

York Creek Watershed Project Receives Additional Funding

The York Creek Watershed Project received a \$300,000 grant from the US Environmental Protection Agency to implement the ideas in the York Creek Watershed Project Watershed Management Plan, developed with an earlier grant. The project, in which WRI has partnered with Kent County's Alpine Charter Township since 1993, will take the Institute the next step in directly applying its research in the west Michigan community.

The project will focus in the next three years on improving stormwater management and soil erosion control practices in the watershed, where

extensive development has occurred in the last thirty years. WRI is assisting in the development of a new Alpine Township Master Plan, a stormwater management ordinance, an expanded Adopt-A-Stream program, and other activities in addition to coordinating the installation of Best Management Practices (BMPs) at critical sites throughout the watershed.

In addition, the Watershed Management Decision Support System (DSS), developed by WRI for Alpine Township, will become an integral part of township operations during the next three years of the project.

1995 Program Expands In 1996

WRI-MDA Gypsy Moth Suppression Program In 1996 Includes 16 Counties Throughout Southern Michigan

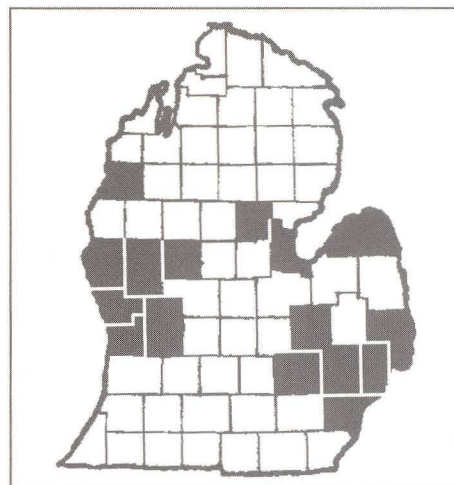
The Water Resources Institute (WRI) has once again partnered with the Michigan Department of Agriculture (MDA) Gypsy Moth Suppression Program. This alliance began with a trial program in 1995 with five counties in southern Michigan. The WRI-MDA 1996 program expanded to include 16 counties (see inset map), each having gypsy moth infested areas that were targeted for aerial spraying with the biological pesticide *Bacillus thuringiensis* (B.t.). Collectively this represented approximately 79,000 acres of infested forested land identified by MDA's Pesticide and Plant Pest Management Division and county gypsy moth program coordinators.

The 1996 program began in January with a workshop hosted by WRI's Information Service Center (ISC). Working in the advanced computer facility, ISC technicians instructed

county gypsy moth program coordinators and MDA regional supervisors on the use of digital mapping techniques and global positioning system (GPS) technology in the delineation of gypsy moth infested areas.

ISC technicians received paper base maps from each participating county throughout winter and early spring. The next step was to convert each of these infestation sites from paper data into a digital computer file. Each area was verified against the base map for both size and location. ISC constructed pilot maps and tabular information regarding the total acreage to be sprayed in each county. The digital map files were then uploaded to the aerial applicator's GPS navigational equipment, which ultimately guided the pilot to the infested site requiring aerial application of the pesticide.

For additional information about this and other GPS related technologies available at the Water Resources Institute, contact WRI Research Associate Kurt Thompson at (616)895-3091.



The Michigan Department of Agriculture and WRI cooperated with 16 counties to participate in the 1996 Michigan Gypsy Moth Suppression Program.

W.G. Jackson Launches...continued from front page

site into Heritage Landing, one of the finest festival grounds in the state. Many believe the *W.G. Jackson* will act as a catalyst for further development. "The Muskegon community really came together on this project," said Grand Valley's President Arend D. Lubbers of their efforts to raise \$1.6 million. "They have laid a foundation in west Michigan and in Muskegon to make this area one of the most important freshwater research centers in the nation."

Muskegon residents Roger Andersen and Dr. William Schroeder served as co-chairs for the local "Making

Waves in Muskegon" campaign. Approximately \$650,000 was spent on construction of the vessel and the rest was placed in an endowment to fund on-going programs and maintenance projects. The State of Michigan also contributed \$250,000 to the project as well as significant gifts from the Brunswick and SPX corporations of Muskegon, corporate donations, and individual gifts.

The *W.G. Jackson*, which includes extensive aquatic research equipment, two 500 horsepower engines donated by Detroit Diesel, sleeping quarters, and a galley, will be able to travel

fast and far across Lake Michigan without needing to return to port. Ward anticipates research and educational trips from Little Traverse Bay to the Milwaukee-Chicago coastline.

"This new vessel represents many exciting possibilities," said Ward. "Not only will we be able to expose more students and community groups to the importance of water conservation and scientific research, but we will also now be able to collaborate with Muskegon as well as Grand Haven, working together to improve the quality of our Great Lakes."

WRI Receives Grants

The Water Resources Institute (WRI) received two separate grants this summer from local foundations that will carry WRI into both urban and rural communities. From the Frey Foundation of Grand Rapids, WRI received a three-year grant to develop a comprehensive program for farmland preservation. From the W.K. Kellogg Foundation (WKKF) of Battle Creek, WRI received an 18-month Groundwater Education in Michigan (GEM) grant to continue information dissemination in our area related to groundwater.

WRI received its first grant from the Frey Foundation in 1993 to develop the Population Allocation Model (PAM). PAM links land use trends with population projections to simulate future residential growth. One important outcome to result from this project was the partnership established between WRI and West Michigan Environmental Action Council (WMEAC), Natural Areas Conservancy of West Michigan (NACOW-MI), and the Grand Valley Metro Council (GVMC).

The second Frey grant, which began in August, consists of three tasks:

- Task #1: Test Prime, Unique, and Valuable (PUV) assessment factors and Land Evaluation/Site Assessment (LESA) analysis through a pilot project with the North Kent Townships Association (NKTA).
- Task #2: Collaborate with NKTA in creating a politically appropriate and scientifically sound system for farmland preservation.
- Task #3: Assist NKTA in the development of sustainable agriculture initiatives.

WRI received its first GEM grant from WKKF in 1988 to establish an extensive groundwater data base for a six-county area in west Michigan. Since 1991, WRI has expanded this data base to include land use and soils information and has gained a reputation throughout the state as a leader in the use and application of Geographic Information Systems (GIS).

WRI used its second GEM grant, ending May 31, 1996, to provide technical support to local units of government around the area. This support included the development of

Groundwater Protection Decision Support Systems (DSS).

The third GEM grant, that began in June of this year, is intended to extend WRI's existing technical support efforts. WRI will conduct a series of workshops to educate local units of government and area decision makers regarding the vulnerability of groundwater resources and the use of information tools. WRI will be working with the MSU Institute of Water Research and other GEM Regional Centers across the State to further disseminate GEM related materials.



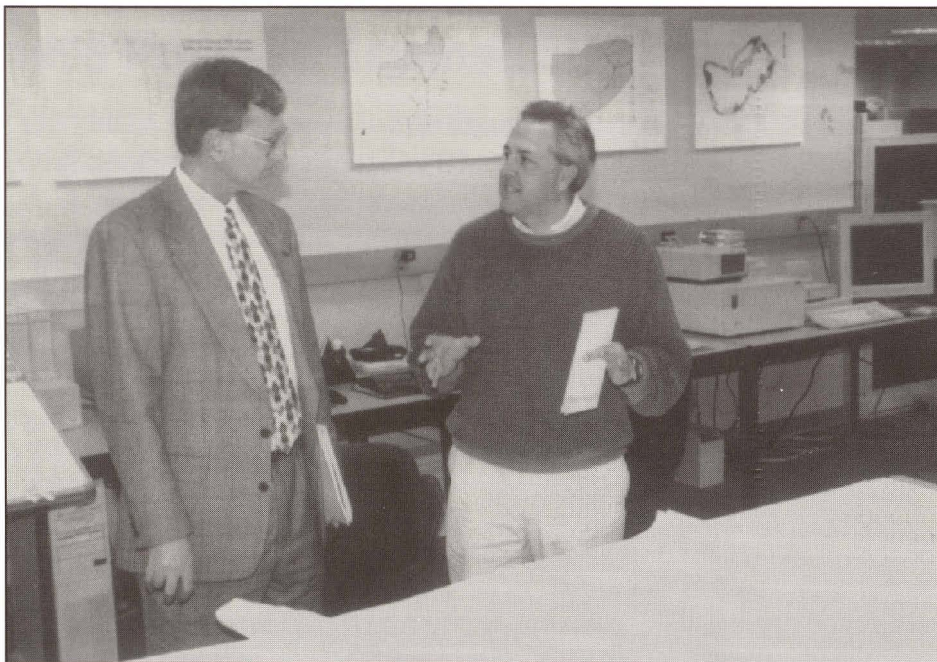
Farmers Receive Training In Surface Water Quality

The Water Resources Institute (WRI) is providing training in surface water quality indicators for agriculture professionals in west Michigan. The program, one of only 10 in the Midwest, is funded by Congress through the United States Department of Agriculture's (USDA) Sustainable Agriculture program.

Two training sessions have been conducted to date, involving not only classroom instruction, but also hands-on field work. The participants have conducted macro-invertebrate identification and stream condition analysis in the Bear Creek watershed in Kent County, as well as water quality and sediment testing in Muskegon Lake and Lake Michigan using the *W.G. Jackson*.

Dr. George Bird, training coordinator for USDA's North-Central region said, "The exciting thing about WRI's proposal is the use of a research vessel like the *Jackson*. By giving our agricultural professionals in Michigan access to tools of this caliber, we enable them to provide information to the farmers in west Michigan that will lead to more informed decision-making processes."

For further information on this project or opportunities in sustainable agriculture training, contact Rich Bowman, Project Coordinator, at WRI, (616) 895-3749.



Russell Harding (left), Director of the Michigan Department of Environmental Quality (MDEQ), and John Koches, Manager of the Information Services Center (ISC) at the Water Resources Institute, discuss the development and use of Decision Support Systems created for local units of government and area decision makers. Mr. Harding visited WRI to acquaint himself with its various projects and to tour facilities located in the new Padnos Hall of Science.

WATER RESOURCES
Review

Stephanie Tuttle, Publishing Coordinator
Dr. Ronald Ward, Director

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WATER RESOURCES REVIEW
Water Resources Institute
Grand Valley State University
One Campus Drive
Allendale, MI 49401

phone: (616) 895-3749
fax: (616) 895-3864