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AREA'S FIRST TRI-COUNTY GROUNDWATER CONFERENCE SEEN AS A MAJOR SUCCESS

Elected and appointed officials from Kent, Muskegon, and Ottawa Counties met for the first time on June 12, 1989 with the sole purpose to discuss groundwater issues affecting their respective communities. This first Tri-County Groundwater Conference was cosponsored by the GVSU Water Resources Institute, and the MSU Cooperative Extension Service. It was organized as part of WRI's Groundwater Education in Michigan Program. WRI hosted the well attended conference at the L.V. Eberhard Center located in downtown Grand Rapids, Michigan.

Conference proceedings covered a full afternoon and began with opening remarks from Dr. Ronald Ward, Director of the Water Resources Institute.

Dr. Ward focused attention on the cooperative spirit which prevailed during the conference, and he complemented those individuals who took part in its organization. Dr. Ward went on to stress the need for just this kind of cooperation at all levels of water resource management, and he indicated that such activity was an essential element for successful programs. Dr. Ward took the opportunity to highlight problems faced by the City of Grand Rapids and other municipalities which impact the Grand River. He suggested that the formation of a Grand River Watershed Council, having representatives from the various municipalities and agencies affected, might be an important first step to the identification of "real" solutions.

Joseph VanderMeulen, Director of the Science and Technology Division of the Legislative Service Bureau gave the keynote address. Mr. VanderMeulen spoke to groundwater concerns in general and offered for consideration statistics specific for each county. Mr. VanderMeulen stressed in his presentation the expense of groundwater cleanup operations, and suggested that groundwater protection is a more cost effective and more easily implemented plan of action.

John Koches, WRI- Research Associate, provided a brief overview describing common geologic features and typical groundwater pollution problems. If Mr. Koches' comments were given an overall theme it would be that everyone is affected by groundwater contamination whether or not he or she actually drinks from a groundwater well. Many businesses and industries remain dependent on groundwater supplies. The clean-up of contaminated groundwater is costly and often involves state and federal funds. It is also important to remember that groundwater is just one element of the hydrologic cycle, and that many lakes and streams are in fact polluted indirectly by inland sources which first contaminate groundwater.

Some of the other topics discussed include the following.

"Agriculture and It's Impact on Groundwater", presented by Dr. Karen Renner, Specialist, Crop & Soil Science, Michigan State University.

"Understanding Groundwater and It's Impact", Les Toth, Director Environmental Health, Ottawa County Health Department.

"Who's Liable When Groundwater is Contaminated", Dr. Leighton Leighy, Specialist, Department of Resource Development, Michigan State University.

"Septic Systems - An Impact on Water Quality", Dean Solomon, District Agent, Kellogg Biological Station, and George Pio, Director, Environmental Health, Kent County Health Department.

"State and Local Governments...Groundwater Partners", Peggy Johnson, Director, Clinton River Watershed Council, and Timothy Wright, District Supervisor, Waste Management Division, Department of Natural Resources.

"There Ought to be a Law", Shari Schaftlein, West Michigan Environmental Action Council.

Following the group sessions described above, participants were organized into "County Huddles". These huddles allowed those individuals representing a given county to get together and discuss groundwater problems specific to their geographic area.

County Huddles were organized using a "Nominal Group Technique" developed by Andre Delbecq and Andrew VanDeVen as modified by R.D. Vlasin. (R.D. Vlasin was actually present during the conference

and was kind enough to act as a facilitator during discussions with the Ottawa County Huddle.) This technique insures orderly discussion and all but guarantees useful results.

Each of the Huddles were divided into smaller more manageable groups. Each of the Huddles were asked the same question: What are the key local groundwater issues/concerns for our county? Each participant in every group was given a chance to respond. The group then is allowed to rank each response, and in this fashion the most important issues and concerns are identified.

Kent County representatives identified the following groundwater "issues/concerns" as priorities.

1. Education is critical to the eventual solution. The need for action should be based on fact and not emotion. It is important that we all understand risks and benefits associated with groundwater quality.
2. Kent County representatives thought the separation of sewer and storm water very important.
3. Leaks from illegal or legal dump sites were identified as a priority concern.
4. Solutions and decision making involve all interested parties and aspects.
5. Tri-County cooperation is essential.

Muskegon County participants offered their own opinions regarding priorities for Muskegon County.

1. The most important issue facing Muskegon County was reported to be the Chemical Plant pollution of groundwater, in particular existing Super Fund and Act 307 sites.
2. Prior contamination of industrial sites limits land use and redevelopment opportunities.
3. Contamination from solid waste landfills also ranked high, pointing to the need for more and improved recycling opportunities.
4. The Muskegon Huddle proposed the development of groundwater pollution control strategies tailored to each local unit of government.
5. Funding was identified as a major concern. Factors regarding funding should be built into local budgets on an on-going basis.

And finally, Ottawa County representatives shared their concern.

1. The Ottawa County contingent suggested the development of safe low cost refuse disposal and reuse alternatives.
2. They wanted to identify major sources of groundwater contamination.
3. Who pays for cleanup? It should be the landowners responsibility.
4. Legislation should be developed if needed.
5. Education of public and business is critical.

While the Water Resources Institute and others involved in these proceedings have yet to fully assimilate all that was learned, an expected outcome from this conference is the formation of a Tri-County Groundwater Advisory Board. More regarding the formation of this Board will follow in subsequent editions of the REVIEW.

More than 65 local officials registered for this event, yet it is estimated that as many as 100 individuals actually participated. Thank you for your interest.

Also, a special thank you and acknowledgment is extended to the Cooperative Extension Directors: Jerry Draheim - Ottawa County, William Harrison - Kent County, and Roger Peacock - Muskegon County. Without their help, and the assistance of Dean Solomon, District Extension Leader - Kellogg Biological Station, this conference would not have been possible.

For those readers who might be interested in the statistical summary provided by Mr. VanderMeulen, please call 616-895-3749.

WRI - SWCD COOPERATION HIGHLIGHTED IN NEW GEM PROPOSAL

The Ottawa County Soil and Water Conservation District has recently applied to the W.K. Kellogg Foundation for its own GEM Grant. The proposed project, which was developed by Mr. Jack Sage, District Conservationist - U.S. Soil Conservation Service, and Ms. Heidi Hollenback, Conservation Planner, also with the SCS, capitalizes on established programs and existing structure to educate the general public about groundwater concerns.

If the SWCD were to receive a GEM award, they propose to hire an educator who's sole responsibility will be to organize a grass roots program of groundwater education in Ottawa County. An advisory group will be formed and education objectives identified. Tasks thus far articulated include:

- Implement groundwater education curriculum for grades K-12 in one school district the first year, and at least 6 school buildings each year there after.
- Establish Groundwater Protection Week as an annual event in Ottawa County beginning in 1991.
- Work with WRI to give annual educational presentations and/or seminars to all county, township, city and village planners regarding the need for land use planning to protect groundwater.
- Utilize existing groundwater literature and publish additional materials as needed for distribution.
- Establish stewardship program in four or more churches each year.

The SWCD proposal emphasizes continued cooperation and coordination with WRI and the Michigan State University Cooperative Extension Service. In fact the SWCD proposal is tailored to complement ongoing groundwater education programs already underway by both agencies.

WRI HIGHLIGHTED IN GVSU 1990 REF PROPOSAL

Each year for the last four years, the Michigan Department of Management and Budget has offered funds to Michigan's public colleges and universities in support of research activities. This research is specifically intended to increase economic development opportunities throughout the state.

The Research Excellence Fund, or simply REF as it has come to be called, supports projects and programs in no less than fifteen institutions of higher education. Projects and programs funded include research in robotics, coatings, toxicology, fisheries, materials processing, machine intelligence, horticulture, optical sensors, and water resources. Each school is given the opportunity to evaluate its own talents and expand upon its own interests in the development of proposals to the state. These proposals are reviewed by a selected panel who judge each proposal on its own merit using established criteria. These criteria include, but are not limited to the following.

- Research should lead to the development of scientific or technological discoveries.
- Research should provide a tangible, direct benefit to the economy of the state or region.
- The applicant has an ability to generate outside funding sources for the proposal.
- The applicant demonstrates the ability or submits a plan for transferring research results or technology advances to the private sector.

The Grand Valley State University Water Resources Institute has received only nominal support from the REF Program for the last three years. However, the University has decided to Highlight the Institute in its Fiscal Year 1989-90 proposal to MDMB.

Assuming final approval by MDMB, the WRI is expected to receive a REF grant of approximately $100,000. These funds would allow the WRI to focus its attention on yet another critical issue to west Michigan. The expected REF grant will allow WRI to develop waste reduction and treatment programs for local industry.

REF dollars will be used by the Institute to hire a trained and experienced Chemical Engineer. This Engineer will work with WRI's Hydrogeologist, Dr. Kevin Cole, other staff members, and the local business and industrial community. The study team thus formed will work in a cooperative fashion to develop and implement waste reduction and treatment systems, advanced underground liquid storage techniques, and innovative groundwater monitoring procedures. Program activities will focus for the most part on small, developing, and otherwise financially limited firms. The study team will use their expertise to characterize existing problems, theorize about future needs, and then research cost effective solutions.

WRI ASSOCIATE CONTINUES AGNPS RESEARCH

The West Michigan shoreline Regional Development Commission was recently awarded a $54,000 Grant from the Michigan Department of Natural Resources as part of its 205(j) program activities. (205(j) refers to that section of PL 92-500, The Federal Water Pollution Control Act, which allows for the study of water quality management by individual states.) The WMSRDC proposal calls for the assessment of land use and land use change on the water quality conditions in Oceana, Muskegon, and Ottawa Counties.

Professor Frederick B. Bevis, WRI Associate and Associate Professor of Biology at GVSU will receive approximately $20,000 to continue ongoing AGNPS research activities. AGNPS, the Agricultural Nonpoint Source Model, was originally developed by the U.S. Soil Conservation Service. Professor Bevis has been working for more than a year to evaluate the effectiveness and eventual usefulness of this model as it applies to a variety of land use activities. This initial investigative effort was supported in part by WRI.

Professor Bevis has thus far limited his research efforts to the Bass Creek Watershed in Ottawa County. Bass Creek will be used further as a pilot study area to test more detailed analytical techniques. Professor Bevis intends to expand his analysis to include similar watersheds in both Muskegon and Oceana Counties. The WMSRDC shall assist Professor Bevis by identifying high priority watersheds. WMSRDC other program activities will include the development of a Geographic Information System.

As a former GVSU graduate, WMSRDC Program Manager, Linda Anderson, has expressed considerable interest and enthusiasm regarding the proposed collaboration. Joining in this effort, and helping to insure its overall success, is the firm PASSWORD, headed by Sylvia Dulaney, President. Ms. Dulaney brings considerable experience regarding the practical use of computer hardware/software and associated techniques.

MSU ORGANIZES GEM CELEBRATION

"As individuals, we all have an impact on the quality of our groundwater. It is imperative that we protect this vital resource for generation to come."

Such was the motivation behind the Michigan State University Institute of Water Research as staff busily prepared for what had been termed a "Groundwater Education in Michigan Celebration". Dr. Jon Bartholic, Program Director - W. K. Kellogg Foundation, and Director - MSU Institute of Water Research, announced the prestigious event in mid August.

The Groundwater Celebration took place as scheduled on October 9, 1989 at the Radisson Hotel in Lansing, Michigan. Participants included Dr. Russ Mawby, C.E.O. of the W. K. Kellogg Foundation, and MSU President Dr. John DiBiaggio. Many key legislative, industrial, state and community leaders also attended.

The Celebration also offered the opportunity to praise noted individuals and/or organizations for their exemplary work in groundwater activities throughout the State. Recipients of "Groundwater Education and Protection Awards" are listed below.

- Mary C. Brown, Representative of District 46 to the Michigan Legislature, received an award in recognition of her continued efforts and innovative proposals for the protection of groundwater quality.
- Elma Toumisalo, SEE - North, received an award for her part in the organization of "Classroom GEMs", a study to develop statewide groundwater education curricula.
- Dean R. Solomon, District Extension Leader with the Michigan State Cooperative Extension Service, received an award on behalf of the CES and the counties of Allegan, Van Buren, and Barry. Together the CES and these local units of government were able to set in motion a cooperative program that focuses on groundwater protection and management.
- Peggy Johnson, Clinton River Watershed Council, received an award on behalf of the Council in appreciation of their efforts as a Non-Profit institution with significant contribution in groundwater education both locally and throughout the State.
- Richard Passero, Professor - Geology Department, Western Michigan University, received an award for his individual efforts in the area of groundwater research, referring specifically to his development of the AQUIPRO assessment strategy used to help identify aquifer vulnerability.
- Lillian Dean, Environmental Consultant, was also identified as an individual deserving of special recognition due to the many years of effort she has given statewide to the understanding of groundwater principles and the education of local government officials.

The Celebration was organized to highlight a wide variety of groundwater educational activities. A multi-media presentation had been developed to emphasize groundwater activities involving universities, organizations, and environmental groups working on GEM related projects.

(All of the quotes identified have as the source correspondence from Jon F. Bartholic, August 16, 1989.)

COMPUTERIZED INSTRUCTION READIED FOR CLASSROOM USE

WRI staff member Melvin L. Northup, Professor of Natural Resources Management, has spent much of his summer in the development of Interactive Computer Programs designed for use in Groundwater Education.

In a recent announcement prepared by Professor Northup, he states, "A set of PC-compatible groundwater education programs will be available for preliminary review, evaluation and use in September." These learning tools will be available in either 3.5 or 5.25 inch floppy format.

Professor Northup has designed his programs with considerable flexibility. Each is "Menu Driven" allowing the user to chose his or her own level of difficulty. The programs are "self-paced", and thus encourage independent study and promote self-esteem through positive reinforcement. They are also "self-adjusting", meaning that the users response to queries will route the presentation to an appropriate level of difficulty and detail. Another feature that Professor Northup has found helpful is the availability of an "On-line Dictionary", in which the meaning of important key words can be called up with a single keystroke for immediate review.

"The displays currently incorporate a mix of Text, Color Graphics, Animation, Sound, and Music. The capability for speech will be added soon."

Groundwater Topics include: Nature of Groundwater, Origin of Groundwater, Movement of Groundwater, Exploitation of Groundwater, Conservation of Groundwater, Groundwater Issues and Responsibilities.

These programs will be tested this fall in several Grand Rapids, Grand Haven area schools. The preparation of such interactive learning tools will be the topic of discussion for a workshop offered by Dr. Northup and WRI on November 10, 1989.

For more information about these programs, their availability, and the upcoming workshop, contact WRI (616-895-3749) or Professor Northup directly (616-895-3444).

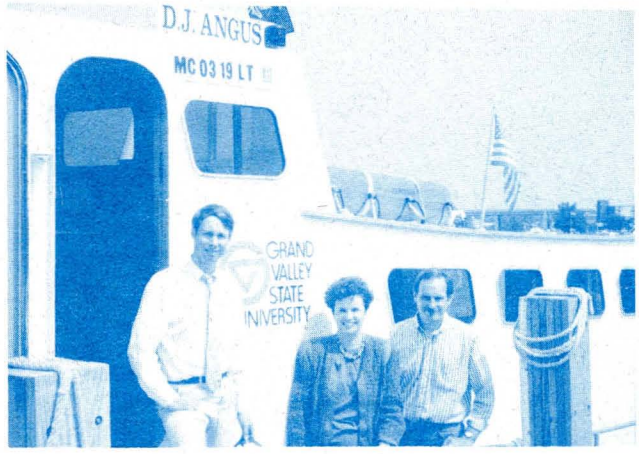
SCIENCE FAIR WINNERS TOUR WRI

The D.J. Angus - Scientech Educational Foundation of Indianapolis, Indiana is the sponsor of the annual Central Indiana Regional Science Fair. Children in the 7th, 8th, and 9th grades are eligible for this judged competition. This year's winners were awarded a "Day's Work Cruise" aboard the GVSU Research Vessel, D.J. Angus. The winners were also given a tour of the WRI's new offices and a demonstration of the Groundwater Data Base.

Winners for this year's competition included the following:

- Lynn Rodzilowski, Our Lady of Mt Carmel, 7th Grade. Lynn's project was titled, "How do Pollutants in the Air Affect the Growth of Grass".
- Liz Majors, Belzer Middle School, 8th Grade. Project title, "How do the Evaporation Rates of Water Compare in Different Household Environments".
- Heidi Queck, Franklin Township Middle School, 8th Grade. Project title, "How does the Soil's pH Affect Plant Growth".
- Katherine Baker, Indian Creek Middle School, 8th Grade. Project title, "Colored Light - Its Effect on Plants".
- Cathy Allen, Carmel Jr High School, 9th Grade. Project title, "The Effects of Metals on the Hatching of Brine Shrimp".
- Sarah Hogan, Center Grove High School, 9th Grade. Project title, "Effects of Sewage Effluent on Benthos".
- Leelie Willis, Carmel Jr High School, 9th Grade. Project title, "How Does Treated Sewage Affect the White River".

The Water Resources Institute congratulates these students, their teachers, and their schools. Also worth special mention is Mr. Robert B. Annis, Chairman of the D.J. Angus-Scientech Educational Foundation and other Foundation members for their efforts in the organization of this highly successful event.



D. J. Angus cruise of Grand River/Lake Michigan Environs. "Working Crew" from left to right: Congressman Fred Upton, Ottawa County Chairperson- Jessie Dalman, and State Representative William Van Regenmorter

RESEARCH VESSEL D.J.ANGUS HOSTS DISTINGUISHED GUESTS

More than 2500 participants have studied aquatic resources aboard the GVSU Research Vessel, D.J. ANGUS so far this season. Many of these individuals were students with class work activities requiring aquatic research. Many others were simply interested visitors who had heard about or seen the vessel and stopped long enough to find out what she was about. Also added to this list are some notable dignitaries like the Honorable Fred Upton, U.S. Congressman from District 4; William VanRegenmorter, State Representative from the Jenison area; and Jessie Dalman, Chairperson of the Ottawa County Board of Commissioners.

Aside from visits involving distinguished quests, some of the more notable engagements of the D.J. ANGUS have included an "open house" in Escanaba and demonstration cruises in South Haven as GVSU helped both communities during their Celebration of the Great Lakes Festivals. Of course the D.J. ANGUS made its traditional appearance at its home port in Grand Haven as GVSU continues to support the City during its annual Coast Guard Festival.

One project in which the vessel and crew continue to receive considerable acclaim actually took place last year and involves the study of ozone pollution over Lake Michigan. This study was conducted as a joint effort by the Michigan and Wisconsin Departments of Natural Resources.

Experiments were conducted and air quality measurements collected July 29, 1988. The intent was to establish whether local exceedance of ozone standards is actually a result of predominate weather patterns and pollutant contributions from the west and southwest across Lake Michigan. Study results were published by Craig A. Fitzner and John C. Schroeder from the Michigan Department of Natural Resources, Air Quality Division; and Richard F. Olson and Paul M. Tatreau from the Grand Rapids Environmental Services Department, Air Pollution Control Division. Results appeared in the May 1989 issue of the 'Journal of Air Pollution Control Association'. The data presented supported early assumptions regarding the "upwind" source for this air pollution problem.

WELL-LOG DATA BASE – A PROGRESS REPORT

The Water Resources Institute began its work to compile a well-log data base for Ottawa County in 1986. This initial effort was undertaken by Dr. Norman TenBrink, Professor of Geology, and marked the first faculty research project to be sponsored by WRI.

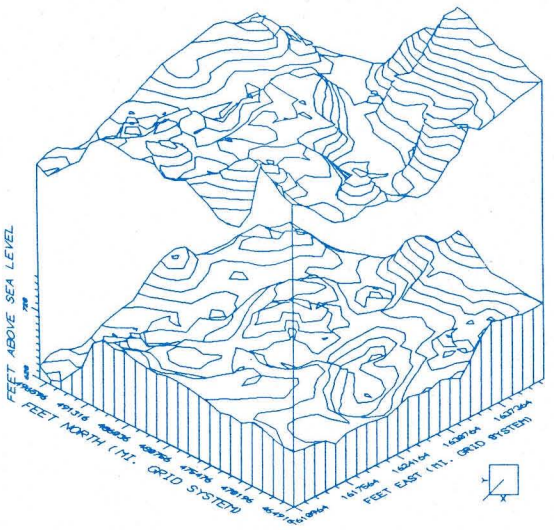
Dr. TenBrink published, as part of his preliminary findings, a 700 + page report titled, Ottawa County Groundwater Maps & Geologic Cross Sections, February 20, 1989. This document contains a detailed description of hydrogeologic conditions within each of 17 individual townships. This report was delivered along with the actual computer data base to the Ottawa County Health Department late last spring.

Dr. TenBrink's work is significant, not just because of its implications for Ottawa County, but because he had identified techniques and a methodology which has proven useful in other areas. Dr. TenBrink's efforts have formed a cornerstone upon which WRI has been able to build increased capabilities.

By the time Dr. TenBrink had completed his initial investigative work in Ottawa County, the Michigan Department of Natural Resources was in the process of finalizing its Statewide Groundwater Data Base Strategy. While some of the specific tools used by the MDNR differed considerably from those employed by Dr. TenBrink, much thought had been given to the compatibility of the two systems. The Institute was thus able to make its transition from one approach to the other with little difficulty. And in fact, the methodology offered by the MDNR helped to automate many labor intensive procedures thus improving the speed and accuracy of data entry activities.

The WRI has enjoyed considerable good fortune and success during the summer months. First, it was able to hire three students under the Michigan Youth Corp Program. These students did little more for three months but enter well-log data into a computerized system. The Institute was in this way able to compile data for more than 10,000 wells in Kent and Muskegon Counties. The Institute is in the process now of generating maps and performing cross-section analysis for Kent and Muskegon using the research completed in Ottawa as a guide.

The Institute would like to thank Rebecca Aikens, Ottawa County Community Action Agency, for her personal efforts in providing much needed student help. And the students themselves are to be applauded for their diligence and perseverance throughout. The student team included Linda Burtch, Kristen Organ, and Rebecca Kincaid.



Stacked 3-D Contour Map showing Surface Elevation (top) and Glacial Drift Aquifers (bottom) in Bryon Township, Kent County.

-PRISE- GETS ITS START AT GVSU

The June issue of 'Water Resources Review' announced WRI's receipt of a $361,319 grant from the National Science Foundation. This grant was awarded to establish a new program for WRI referred to as PRISE, Project to Improve Science Education. The program is specifically intended to help better prepare prospective elementary teachers to teach science curricula.

As a consequence of PRISE, Grand Valley State University has added to its Fall Semester a new course titled, "Our Water Resources". This new course offers future elementary teachers hands-on investigative study of our region's water resources; including lakes, ponds, streams, and groundwater. These students will have an opportunity to experience first hand field studies aboard the research vessel D.J. Angus, and will be collecting water quality information from the Bass Creek watershed in Ottawa County.

Dr. Ron Ward, WRI Director, will continue to serve as Project Director for PRISE. Working with Dr. Ward on PRISE are a number of GVSU Professors from a variety of Departments. Included on this list of participants is the latest WRI staff member, Tom Kelly. Kelly is on extended leave from the Grandville Public Schools where he is a Elementary Science Specialist. Along with his appointment as Research Associate for WRI, Kelly is a visiting instructor for the GVSU Biology Department.

The next course to be offered as part of PRISE will be Geology 111, to be taught by Professor Richard Lefebvre during the Winter Semester of 1990. Courses in Physics and Chemistry are also contemplated.

RURAL GROUNDWATER STUDY NEARS COMPLETION

WRI researchers began a study to characterize groundwater chemistry in rural Ottawa County early this summer. Dr. Edward Baum, Professor of Chemistry, headed a study team which collected and analyzed groundwater samples from various locations throughout the county. These locations were determined in part by aquifer vulnerability analysis conducted by others at GVSU, and after consultation with local representatives of the Michigan State University Cooperative Extension Service.

While results from this investigative effort remain preliminary, general trends are apparent and worth mention.

- First, we knew from previous investigations that there are several residential areas in Ottawa County where groundwater quality fails to meet the USEPA Safe Drinking Water Standard for nitrate. In other words, groundwater samples often contained concentrations of nitrate which exceeded the 10 ppm standard recommended. (Groundwater Quality in Ottawa County, Michigan; WRI MR-89-1.) Even so, all of the groundwater samples collected from farming areas and thus far analyzed were able to meet the standard established for nitrate.

- Secondly, Dr. Baum reports he has not been able to detect any significant contamination of groundwater with herbicides. However, "herbicides do appear to be washed quickly into local rivers, and we have found high levels there soon after rainfall". Dr. Baum indicates that the concentration of these herbicides exceed the USEPA Safe Drinking Water Standards. Fortunately, none of our local communities draw drinking water from the stream and river systems analyzed.

While there does not appear to be an immediate health risk from the surface water contamination discovered, this pollution source remains a concern. Not only does such contamination demonstrate the inefficient use of costly agricultural chemicals, but it threatens wildlife habitats and has long term implications for human health.

Dr. Baum is currently on sabbatical from the University, and will be gone from campus until June, 1990. He has indicated that a final report documenting his most recent investigative efforts will be forthcoming by January, 1990.

BUSINESS LEADERS MEET TO SUPPORT GVSU WATER RESOURCES INSTITUTE

On September 21, 1989 Grand Valley State University and the Water Resources Institute was honored to host a luncheon meeting for more than 30 business leaders. This event was organized as an informational meeting, and was intended to acquaint these key individuals with WRI research and community outreach activities. Richard DeVos, President of Amway Corporation, chaired the meeting and shared with those present his desire to help raise as much as 5 million dollars to support continued operation of the Water Resources Institute.

GVSU President Arend Lubbers outlined for the group his vision for the Institute as it relates to the University's overall goals and objectives. Also present during discussions were Douglas Kindcshi, Dean of Science and Mathematics; and Ronald Ward, Director of the Water Resources Institute.

The Institute exhibited program summaries describing various activities from numerous disciplines. Highlighted by these exhibits was the work of approximately 30 professors and staff. The GVSU departments represented included Biology, Chemistry, Geology, Natural Resources Management, and Physics.

Evident in each of the displays presented was a conscientious effort by the Institute to concentrate its research activities in areas that have practical application and promise solutions to 'real world' problems.

HELLO / GOOD-BYE

WRI staff would like to announce and welcome Dr. Frank D'Itri, Professor of Chemistry - MSU, as co-manager of GEM at Michigan State University. Dr. D'Itri will share this position with Carol Misseldine.

Dr. D'Itri and Ms. Misseldine will together assume the responsibilities formerly assigned to Dr. Kyle Kittleson. Dr. Kittleson has left the MSU Institute of Water Research and GEM Program to begin his own landscape company in the Ann Arbor area.

Dr. Kittleson was instrumental in the development of the GEM Program at Michigan State University. His ideas and the direction he provided helped to focus GEM activities throughout the State. WRI would like to thank Dr. Kittleson for his efforts and wish him well in his new endeavors.