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Annis Water Resources Institute

WATER RESOURCE REVIEW

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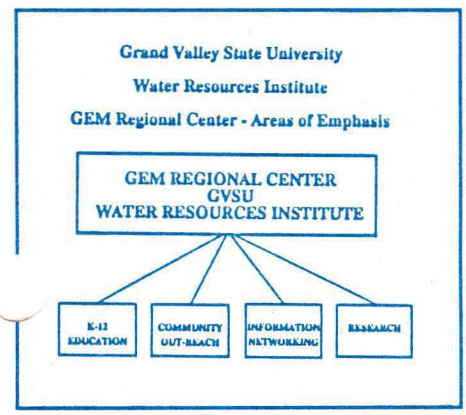
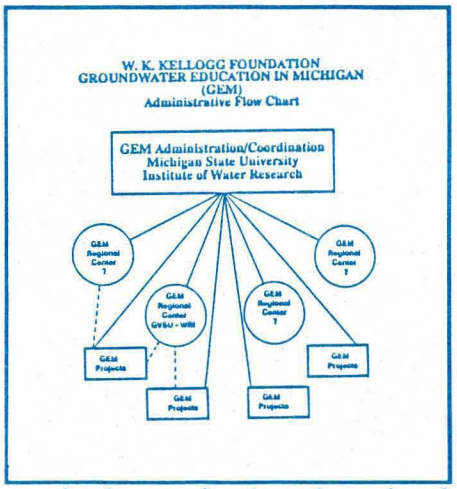
GVSU - WRI Selected as "Regional Center" for GEM

The W. K. Kellogg Foundation has awarded a grant of $580,680 to the Water Resources Institute of GVSU in order to establish the first "Regional Center" for the Groundwater Education in Michigan Program (GEM). GEM is a new statewide program administered by Michigan State University. The primary purpose of GEM is to develop educational programs which lead logically to the protection of groundwater resources. At GVSU, the Water Resources Institute will be involved in four very different but related program areas, all of which have groundwater protection as their ultimate goal. These "areas of emphasis" include the following:

K-12 EDUCATION
COMMUNITY OUTREACH
NFORMATION NETWORKING
GROUNDWATER RESEARCH

In the area of K-12 Education, the Water Resources Institute faculty and staff will be involved in the development of "Groundwater" curriculum. This curriculum will highlight groundwater issues and promote stewardship of this valued resource. The Institute intends to accomplish this task by organizing state and local educators and creating "curriculum modules". These modules will be designed so as to be easily integrated into education programs already established by area schools. The idea here is to involve area teachers in the design of appropriate curriculum, and then assure implementation through a series of training workshops.





Also being targeted is the education of community leaders and decision makers. This is the focus of the Institute's Community Out-Reach Program. The intention is to create an overall awareness of groundwater problems that currently exist, then introduce the tools at our disposal to deal with these problems. Of particular interest in this regard is the development, adoption, and implementation of pollution prevention strategies by local units of government.

In regard to Information Networking, the Institute will serve as a focal point for the collection and dissemination of data relating to groundwater management. To be more specific, the Institute will link western Michigan to a centralized information and database management system being developed by Michigan State University. This innovative data storage and retrieval system is called GEMNET. This new network will provide information on such topics as current groundwater legislation, upcoming conferences, and other groundwater projects.

The GVSU Water Resources Institute has three ongoing Groundwater Research Projects which deal directly with GEM activities. Professor Melvin Northup is investigating the use of computer applications in aquatic education. His work has led to the development of interfacing capabilities allowing microcomputer automation of water quality monitoring aboard the D. J. ANGUS, GVSU's research vessel. Professor Northup is currently working on interactive groundwater programs for use in K-12 science instruction. (Refer to accompanying article, GEM - Teaching/Learning Aids, page 3.)

Professor Norman Ten Brink has been perfecting methods to accurately map, and otherwise identify, various groundwater characteristics. Included in this analysis is the probability and potential for contamination at specific geographic locations.

Professor Edward Baum has developed analytical and statistical techniques which allow the assessment of complex groundwater chemical data. These techniques result in graphic displays which are more easily understood by the general public. (Refer to accompanying article, Groundwater Chemistry Research, page 3.)

Professor Ron Ward, Director - Water Resources Institute, shall spearhead GEM at Grand Valley State University.

Another staff member is John Koches, Research Associate, who will be

From the Director:

I am delighted to have this opportunity to report on the continuing development of the Water Resources Institute (WRI). Since the last Update our Institute has grown in scope and obtained some significant financial support for some of our on-going activities.

Two new faces, John Koches and Tonya Cnossen, have officially joined the WRI staff. John serves primarily in the GEM program, while Tonya is the WRI secretary. The addition of these two positions has greatly strengthened our capabilities to serve the west Michigan community.

A 3-year, $561,000 grant has been obtained from the W. K. Kellogg Foundation to establish the WRI as the first regional center in the GROUNDWATER EDUCATION IN MICHIGAN (GEM) PROGRAM. This grant will fund our ongoing groundwater research and provide for an educational outreach program designed to protect and enhance our groundwater resources.

A 25,000 grant from the Charles Stewart Mott Foundation supported our 1988 public education program abroad the GVSU research vessel D. J. ANGUS. That program of demonstration cruises introduced 222 K-12 teachers, 808 K-12 students, and over 600 of the general public to our region's water resources.

In addition to the grants mentioned above, we have pending other water resources grant applications which will enhance our service to the community. We are optimistic that one or more of those applications will be successful.

The new home for WRI, room 103 Loutit Hall, is currently being remodeled and occupancy is expected to be March 1. That new facility will provide office, library, and laboratory space, and will alleviate some of our current congestion.

The following pages provide greater detail on some of the items mentioned above. However, from this brief report, I am certain that you can appreciate the development of WRI. All of us in the Institute are proud of our achievements to date, and we look forward to the continued improvement and expansion of our water resources programs.

Sincerely,

Ron Ward

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working to provide out-reach between the University and local units of government/area industry. For more information concerning GEM, or the Water Resources Institute in general, simply contact Professor Ward or John Koches at 616-895-3749.

COASTAL PROCESS AND HAZARDS

Dr. William Neal, Department of Geology, continues his work as coeditor and contributing author to the "Living with the Shore" Series. "Living with Chesapeake Bay and the Virginia Shore" was published in January, and the volume on the Maine coast followed. Several volumes are currently in various stags of writing and editing, including Georgia, Connecticut, the Pacific Northwest, Massachusetts, and Lake Michigan.
Dr. Neal expects to work on the Massachusetts volume this summer under FEMA grant support through Duke University.

Geology seniors Kurt Thompson and Graham Crockford are doing a general analysis of threatened coastal property and relations between beach width and engineering structures along segments of the Atlantic Coast in the Carolinas, using a video record. If the technique yields meaningful results, a similar project may be attempted along our local shore.

Results of last year's cooperative work in Portugal will be published in the March issue of the Journal of Coastal Research, and a second manuscript is planned. Results of a cooperative study during an August 1988 visit to Columbia, S.A. also are being summarized in a manuscript which will be completed by summer. At the same time, Dr. Neal will be cooperative investigator in a proposed study of beach nourishment in the Great Lakes. Project funding is currently being sought.

RESEARCH VESSEL D. J. ANGUS

The 1988 season for the research vessel D. J. ANGUS was busy from April to November. During those months a record 2,405 students, teachers and others participated in demonstration cruises. Also, new locations were explored when Pere Marquette Lake at Ludington was visited.

The season started in April when a group of visiting professors from Poland and Yugoslavia were shown a small portion of Lake Michigan near Grand Haven. In May, regular activities began with schools from Free Soil, Grand Rapids, Muskegon, Martin and other cities taking part in sampling water and bottom sediments from Lake Michigan, the Grand River, Spring Lake and Muskegon Lake.

Later in May the boat was used by Grand Valley students enrolled in Biology 475/575, Ecology of the Great Lakes. When not in use with University students, the D. J. ANGUS was busy with groups of girl and boy scouts, business associations, Science Olympiad winners, teacher workshops and courses taught by University faculty.

In all, 808 K-12 students, 222 teachers and 614 GVSU students were able to explore and study the aquatic environment in the Grand Haven area. The teachers in the Ludington district were shown sampling and analysis techniques when the D. J. ANGUS was used in Pere Marquette Lake and in the nearby waters of Lake Michigan.

May 1989 is solidly reserved by teachers who will take their students on board to become active young scientists sampling and analyzing the water and bottom materials of Lake Michigan, Spring Lake and the Grand River. It appears at this time as if 1989 will be as busy and rewarding as the 1988 season.

GROUNDWATER CHEMISTRY RESEARCH

Dr. Edward J. Baum, GVSU Department of Chemistry, has recently published his latest technical report titled, "The Use of Pattern Recognition to Study Groundwater Chemistry". (WRI Technical Report, TM-88-2, GVSU, 11/28/88)

Pattern Recognition is a multivariate analytical technique which has shown considerable merit in the study of air pollution. In fact, it is in this field of research that Professor Baum first developed these statistical methods.

Pattern Recognition has proven most useful when working with large and complex data sets. Such data sets can simply overwhelm traditional methods of data analysis. Unlike traditional statistical methods, pattern recognition techniques grow increasingly accurate as the number of variables increases.

Pattern Recognition uses graphic dislays to visually uncover subtle relationships in the data being analyzed. Professor Baum offers his readers the following as an observation.

"Whereas the human capacity to remember and manipulate information is limited, the human ability to sense patterns is excellent and this ability is exploited in the exploratory step by presenting data graphically."

While Pattern Recognition has never been applied to groundwater studies before, the technique shows considerable promise, particularly given the increased availability of groundwater chemical data. Professor Baum indicates that such techniques can help to focus on key chemical constituents in groundwater supplies. It is thus possible to identify and then classify aquifer systems based on their chemical composition. Perhaps more importantly, the statistical technique can chemically characterize a pollution source, and even measure the impact of contamination on ground water reserves. Using Pattern Recognition it would be possible to differentiate between numerous pollution sources, all affecting the same aquifer with similar pollutant loadings.

Professor Baum uses data sets which originated from three geographic areas in Michigan. These include Bay County, Calhoun County, and Ottawa County. For more information about Pattern Recognition, or to request a copy of the above mentioned report, contact John Koches, Research Associate, WRI.

WATERSHED MANAGEMENT RESEARCH

Professor Frederick B. Bevis has accepted an ambitious project included as part of WRI's current program activities. Professor Bevis will evaluate the usefulness and application of the computer model called AGNPS (Agricultural Non-Point Source Pollution).

As the name implies, AGNPS was developed to assess pollutant contributions to surface waters resulting from conventional farming practices. The model was developed by the U.S. Soil Conservation Service and was adopted for use in several Great Lakes' states, but has met with some criticism here in Michigan. As a result, there are few examples documenting the use of this assessment procedure. Except for research activity underway at the Institute of Water Research, Michigan State University, there appears little interest within the state which would prompt the evaluation of this analytical tool. (MSU Research efforts are referenced in WATER IMPACTS, Volume 10, Number 1 - January 1989)

Not only will Professor Bevis attempt to evaluate AGNPS as a instrument to predict pollutant contribution from agricultural activities, but he will, in addition, evaluate the model's effectiveness to deal with a variety of land uses.

Professor Bevis has thus far limited his evaluation to areas within Ottawa County. Preliminary findings are expected late this academic year.

GEM TEACHING/LEARNING AIDS

As reported in our feature article, Dr. Melvin Northup, Natural Resources Management, has been working on a very specific component of WRI's GEM activities. Professor Northup is working to develop interactive computer teaching/learning aids which highlight groundwater education principles. The presentations being prepared integrate animated graphics, sound, and branched program - learning techniques in a self-contained package. The programs developed will run on any minimally configured IBM PC or compatible system. Initial releases will be designed targeting junior high school grades. It will not be necessary to purchase any additional software beyond DOS.

Each teaching/learning program will be "menu driven" allowing each individual to select his or her own starting point. This might include a review of relevant terms, a browse through bibliographical references, or a presentation of simple hydrogeologic concepts.

Currently, seventeen major program topics are planned. These include an examination of how people affect groundwater, what we can do to prevent groundwater contamination, and even suggests experiments and field trips that might be employed to heighten educational experiences.

PUBLICATION ANNOUNCEMENTS:

D. J. ANGUS Use Manual (TM-88-1)

D. J. ANGUS Annual Report (CR-88-1)

The Use of Pattern Recognition to Study Groundwater Chemistry (TM-88-2)

Groundwater Quality in Ottawa County, Michigan (MR-89-1)

Wells and Groundwater Survey Along M-45, Allendale and Tallmadge Townships, Michigan (TM-88-3)

Well Log Database Operations Manual (TM-89-1)

WATER RESOURCES INSTITUTE

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Water Resource Review

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