

1999 Project Abstract

For The Period Ending June 30, 2001

TITLE: Karst Education for Southeastern Minnesota
PROJECT MANAGER: Bea Hoffmann
ORGANIZATION: Southeast Minnesota Water Resources Board
ADDRESS: Winona State University, Winona, MN 55987-5838
WEB SITE ADDRESS: <http://webdev.winona.msus.edu/semnwrp>
FUND: Environment and Natural Resources
LEGAL CITATION: ML 99, [Chap. 231], Sec. [16], Subd. 11(b)
APPROPRIATION AMOUNT: \$120,000 (LCMR) plus \$35,552 non-required cash match

Overall Project Outcome and Results

A traveling exhibit and a learning trunk were developed by the Science Museum of Minnesota. Visitors to "Karst - A Special Landscape that Needs Special Care" learn about the close connections between land use and ground water quality in southeastern Minnesota's unique and sensitive karst landscape. Karst terrain is typical of areas underlain by carbonate rocks such as limestone or dolomite which crack and dissolve near the bedrock surface. Typical karst features resulting from this cracking and solution are sinkholes, caves, springs, and disappearing streams, all of which provide pathways for substances moving from the land surface to the ground water. It is hoped that viewers of the exhibit will increase their understanding of why special care is needed when making land use decisions in this sensitive landscape.

The exhibit consists of an entry panel with the sound of dripping water, panels on "What is Karst", potential threats to ground water quality, solutions to preventing contamination, and local karst case studies. Map overlays, an interactive faucet demonstration, an interactive ball maze game, and a computer with related web site information, are also part of the exhibit. By October, the exhibit will have been seen by students and the general public at 10 locations throughout the region. It will be housed on a semi-permanent basis at Eagle Bluff Environmental Learning Center but will continue to be available for travel to other locations.

A stand-alone Karst Learning Trunk was also developed. The traveling trunks are complete with curriculum guides, videos, a mini karst exhibit, maps, and hands-on activities designed for classroom use. Nine of these trunks are available throughout the region.

Three workshops for teachers and water quality staff were held at various locations throughout the region. Approximately 90 people attended these workshops. Teachers received an introduction to karst geology, worked with trunk materials, toured the karst exhibit, and worked with local geologic atlas maps.

Project Results Use and Dissemination

The exhibit has been viewed widely in the region since its Grand Opening in January at Eagle Bluff Environmental Learning Center when approximately 100 people gathered to see the exhibit unveiled. Newspaper articles and TV news coverage have appeared at every location where the exhibit has appeared. Continuing use of the trunks will provide ways for teachers to bring this information into their classrooms.

AUG 09 2001

LCMR WORKPROGRAM FINAL REPORT

Date of Report: August 3, 2001

Date of Next Status Report: N/A

Date of Workprogram Approval: N/A

Project Completion Date: June 30, 2001

LCMR Work Program 1999

I. PROJECT TITLE: Karst Education for Southeastern Minnesota

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Total Biennial Project Budget: \$120,000 (LCMR) plus \$35,552 non-required cash match

\$LCMR:	120,000.00
- \$LCMR Amt. Spent:	120,000.00
\$LCMR Balance:	0

A. Legal Citation: ML 99, [Chap. 231], Sec. [16], Subd. 11(b)

Appropriation Language:

Karst Education for Southeastern Minnesota \$60,000 the first year and \$60,000 the second year are from the trust fund to the board of water and soil resources for an agreement with the Southeast Minnesota Water Resources Board to develop teacher training workshops, educational materials, and exhibits demonstrating the connections between land use and ground water contamination in southeastern Minnesota.

B. Status of Match Requirement: none required, however 8 of our nine members counties have pledged \$4444/county out of their water planning base grants toward the development and construction of the karst learning trunks

II and III. FINAL PROJECT SUMMARY: All parts of the project were completed successfully. The completed exhibit and trunk were introduced to staff, public, and mass media through an invitation-only Grand Opening at Eagle Bluff Environmental Learning Center (see attached newspaper articles). Over 100 people attended the Grand Opening. In addition to a two-month stay at Eagle Bluff, the exhibit has now been shown or is scheduled to be shown at the following venues:

- Hormel Nature Center, Austin
- River Bend Nature Center, Faribault
- Whitewater State Park, Elba
- Harmony/Niagra Cave Visitor Center, Harmony
- Olmsted County Fair, Rochester
- Houston County Fair, Caledonia
- Beaver Creek State Park, Caledonia
- Olmsted County Historical Society, Rochester

We are now in the process of drawing up an agreement with Eagle Bluff Environmental Learning Center to have a semi-permanent home for the exhibit at Eagle Bluff in Lanesboro, heart of karst country, and host to thousands of students annually, almost all of whom come from the region. Eagle Bluff sees this as an opportunity to enhance their geology programs. The agreement will state clearly that the Board retains ownership of the exhibit and that from time to time the Board will request that the exhibit be moved to another venue.

The 9 karst learning trunks were completed in time for the three workshops. The Science Museum sent the trunk creator to each of the three workshops to train teachers in use of the trunks. . The trunks include curriculum guides, classroom and fieldwork activities, videos, karst artifacts, posters, karst resource lists, maps, and field guides that illustrate the connections between land use and drinking water quality. Trunks are now distributed to the counties and public relations on trunk availability will continue beyond the grant end date.

Three highly successful and well-attended workshops were held at three different locations and on three different dates throughout the region – Hormel Nature Center, River Bend Nature Center, and Whitewater State Park hosted workshops. The project manager worked closely with nature center and park naturalists and environmental educators to plan, promote, and execute the workshops. Each workshop was tailored to the specific part of the region where the workshop was held—for instance, geologic atlas activities used maps from the teachers' home counties. The keynote speakers focused on karst in the surrounding terrain. Each workshop was filled to capacity, in fact, teachers had to be placed on a waiting list for the Whitewater workshop and unfortunately, some had to be turned away. Workshop evaluations showed a high degree of satisfaction with the workshop presentations and activities. Approximately 90 people in total attended the 3 workshops.

The exhibit includes a "karst computer kiosk" with information on karst. All the files which appear in the exhibit computer kiosk can now also be accessed on the Web page of the SE MN Water Resources Board.

IV. OUTLINE OF PROJECT RESULTS (8/3/01):

- Result 1: Nine self-contained karst learning trunks were developed, constructed, and distributed to counties. Teachers were trained in their use.

LCMR Budget: \$0	Match: \$35552
Balance: \$.33	Match Balance: \$0

Completion Date: Feb., 2001

- Result 2: A museum-quality karst educational exhibit was developed and has been displayed throughout the region. The two interactive components of the exhibit have malfunctioned. They were returned to the Science Museum, have been repaired and re-engineered and were returned to the exhibit.

LCMR Budget: \$98,500	Match: \$ 0
Balance: \$0	Match Balance: \$ 0

Completion Date: January, 2001

- Result 3: 3 workshops targeted for 75 upper elementary and middle school teachers throughout the karst region were planned and held. We served approximately 15 more teachers than originally targeted (90 in total).

LCMR Budget: \$ 10,500	Match: \$0
Balance: 0	Match Balance: \$0

Completion Date: May, 2001

- Result 4: Create karst links to existing electronic environmental directories.

LCMR Budget: \$1000

Match: \$ 0

Balance: 0

Match Balance: \$ 0

Completion Date: May, 2001

V. DISSEMINATION: Through our existing network of water planning staff and state agency staff throughout the region, we publicized the availability of the karst learning trunks, exhibits, and workshops through direct communication with schools, through newspaper articles and public service announcements, in environmental learning center newsletters, and through the Southeast Minnesota Environmental Education Council's contacts.

VI. CONTEXT:

- A. **Significance:** Southeastern Minnesota is located in a hydrogeologically sensitive setting known as karst. Karst terrain is typical of areas underlain by carbonate rocks such as limestone or dolomite which have a tendency to dissolve at or below the bedrock surface. Typical karst features resulting from this dissolution are sinkholes, caves, springs, and disappearing streams, all of which provide conduits for substances moving from the surface to the ground water. In addition, most of the area was not covered by the last glaciation and is sometimes referred to as the "driftless area". As a result, protective glacial till cover through most of the area is thin or nonexistent. This combination of karst features and shallow soil cover strongly affect local and regional water quality by effectively reducing the natural filtering capacity of the geologic materials through which water passes. The existence of karst pathways for surface contaminants entering ground water supplies in conjunction with a predominance of row-crop agriculture throughout the region, account for the continued presence of nitrates, coliform bacteria, and pesticides in municipal and private drinking water supplies. It is also important to note that virtually the entire population of the region depends on ground water sources for their drinking water.

At this time, there is no resource in southeastern Minnesota or anywhere in the state of Minnesota for students and the general public to study karst or its connection to drinking water quality. Contacts with county and state water resource professionals and environmental educators in the region have indicated widespread support for such a project.

- B. **Time:** No additional time requirements are anticipated.
- C. **Budget Context:** The concept for this project was a direct result of a prioritization process by water quality professionals throughout the region. Each of the water plans in our nine-county organization cites public education regarding land use of various types in karst areas as a priority implementation strategy. The administrative work of the Southeastern Minnesota Water Resources Board has been funded for 11 years by its member counties, and supplemented in the last year by an administrative grant from the State of Minnesota. Funding for county water planning is supported by block grants from the state of Minnesota through the Local Water Resources Protection and Management Program – 103B.3361-103B.3369 and through county levies.

1. BUDGET (6/00 – 12/00)

Personnel: Project Coordinator to arrange and facilitate meetings between Science Museum staff and regional staff and educators; solicit ideas for project concepts from local staff; administer contracts and agreements related to the project; begin to organize staff and educators to plan teacher workshops: \$10,000 (one day/wk for 12 months based on 1999 and 2001 projected wage scales)

Equipment: None needed

Acquisition: N/A

Development: N/A

Other: contract with Science Museum exhibit staff to develop concepts for exhibits and karst learning trunks including expenses for travel to southeastern Minnesota to meet with staff and educators. Construct learning trunks: \$50,000 (\$40,000 cash match plus \$10,000 LCMR grant)

2. Budget detail - see Attachment A

VII. COOPERATION:

<u>Cooperator</u>	<u>Amount Pledged</u>	<u>% Time on Project</u>
Fillmore County	\$4444	2%
Dodge County	4444	2%
Goodhue County	0	2%
Houston County	4444	2%
Mower County	4444	2%
Olmsted County	4444	2%
Rice County	4444	2%
Winona County	4444	2%
Wabasha County	4444	2%
SE MN Envir. Education Council		4%
Forestville State Park/Mystery Cave		2%
MN Dept. of Natural Resources- Div. of Waters		2%
Winona State University		2%
SE MN Water Resources Board		10%
MN Dept. of Health		1%
River Bend Nature Center		1%
Eagle Bluff Environmental Learning Center		2%
Hornel Nature Center		2%
Quarry Hill Nature Center		2%
University of MN Geology and Geophysics		2%
MN Pollution Control Agency		2%
Science Museum of MN		50%

VIII. LOCATION: Planning meetings took place throughout the region and at the Science Museum of MN in St. Paul. Teacher workshops took place in 3 different locations throughout the region