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'Electronic democracy,' problem-solving keynotes of GIS meeting

The way democracy works is changing—largely for the better—due to multi-layered, multi-media displays of electronic information. An increasing number of experts in geographic information systems—computerized means of displaying map-based data—see these tools changing the future of public debate and decision making.

Improvements in ways people can get involved in community planning alone could fill hours in Mike Shiffer's urban planning and emerging technology classes at the Massachusetts Institute of Technology. In a talk May 5 at the Mid-America GIS Symposium, held in Lincoln and sponsored by the University of Nebraska-Lincoln Conservation and Survey Division (CSD) and other organizations, Shiffer outlined some of the new tools of "electronic democracy."

In one scenario, he showed that, instead of relying on a substitute or posted minutes, a person missing a community-planning meeting could use the World Wide Web to gain access to people or places involved in the discussion. Through an "electronic kiosk," by clicking on photos of key people representing different constituencies, one could see audio-visual clips of presentations and arguments. Clicking on a map of the city, one could zoom in on a street in a redevelopment project and then watch a video of a drive through the district as it is now, or even examine a computer-graphic rendering of what the improvements will bring. Then one might want to call up data on traffic levels in this part of the city and look at various streets at various times, examin-

Electronic democracy continued on p. 3.

Trust gives second grant for monitoring wells in North Platte NRD

The North Platte Natural Resource District (NRD) and the Conservation and Survey Division (CSD) have received the second of two \$140,000 grants to fund the installation of 70-some more wells in the North Platte Valley in the next year. The money was given by the Nebraska Environmental Trust, a beneficiary of the Nebraska Lottery, to the Groundwater Information Project, a joint program of the NRD and the University of Nebraska-Lincoln's CSD.

Last year about 65 new wells were installed in the North Platte Valley to tap the shallow alluvial aquifer that supplies the valley with water for irrigation, municipal, rural domestic, livestock and industrial uses. When all are installed, nearly 140 new wells will offer further information on the dynamics of the groundwater-surface water system in the valley.

"It's an opportunity to see a lot of geology by putting in a lot of holes," explained Steve Sibray, CSD research geologist stationed at the University of Nebraska Panhandle Research and Extension Center in Scottsbluff. "It was a natural fit between their need to have more wells (for groundwater monitoring) and our ongoing desire to learn more," he added.

In particular, Sibray said, the division wants to help the NRD better understand water-level changes, agricultural chemical contamination and groundwater-surface water interaction in the valley. Seepage from irrigation canals is one important focus of the latter work.

"We think the program gives us some valuable information with which to deal with the responsibility," he added.

Monitoring wells continued on p. 2.

With the article above, Resource Notes begins looking at cooperative projects between the Conservation and Survey Division and Nebraska's natural resources districts, a series to run until all are covered.

CSD field guide supplies questions for Nebraska Envirothon

A Conservation and Survey Division (CSD) field guide to the geology, fossils, river action and natural hazards of the Niobrara State Park area was instrumental to the state finals of the Nebraska Envirothon, a competition for high school students in natural resources administered by the Nebraska Association of Resources Districts. Fourteen schools competed in the meet held at the state park near the confluence of the Missouri and Niobrara rivers.

Two CSD faculty assisted as well. Duane Eversoll, CSD associate director, helped judge the oral examinations, and Sue Lackey, an assistant geoscientist at the CSD Norfolk office, contributed questions from the CSD field guide and helped plan the competition. The winners of this year's state competition, from Cambridge, will go to a national meet held July 25-August 2 in East Lansing, Mich., sponsored by the National Envirothon Association, a group made up of many different natural resource

organizations. The Envirothon is becoming more of a constant in the division's outreach work. Two years ago, Jim Goeke, a geologist at the CSD North Platte office, also worked intensively with the team from North Platte that went to the national finals, when they were held at Mahoney State Park near Ashland.

Eversoll, a co-author of the state park field guide, entitled "Geology of Niobrara State Park, Knox County, Nebraska, and Adjacent Areas—With a Brief History of the Park, Gavins Point Dam, and Lewis and Clark Lake," said the guide was given to the students as part of the preparation materials. In addition, orals involved questions from the guide on the park's geology, natural hazards and the formation of the delta at the mouth of the Niobrara, the result of damming the Missouri just downstream and the sedimentation building up at the shallow end of the reservoir. Other problem areas examined in the compe-

Envirothon continued on p. 2.

The newsletter of the Conservation and Survey Division

Institute of Agriculture and Natural Resources/University of Nebraska-Lincoln

Monitoring wells *continued from p. 1*

bilities under the (state) Groundwater Management Act (GMA) and in general adds to our understanding of groundwater in the area," said Ron Cacek, manager of the NRD. The GMA requires NRDs to develop a plan for integrated management of groundwater and surface-water quantity and quality problems.

The NRD has also been involved in cooperative work with the U.S. Geological Survey that looked at water quality, Cacek said, and this new program adds to that effort. Regarding that 1995 USGS report, Sibray, who was a co-author, said that nitrate contamination was not a severe problem in the NRD, but a few places had been identified as potential problem areas.

Environthon *continued from p. 1*

tion were the high water table, the diminishing channel capacity of the Missouri and the inundation of lowlands around the mouth of the Niobrara, he said. Charles Flowerday, CSD editor, and Robert F. Diffendal, Jr., CSD research geologist, edited the multi-author field guide.

Besides the orals, questions covered various field subjects at six testing stations regarding aquatics, forestry, soils, range

The drilling has allowed CSD to use electronic geophysical logging equipment acquired recently to understand the subsurface. Geophysical methods of acquiring earth-science information include measuring spontaneous potential, the natural electrical current in the earth, single-point resistance and resistivity, methods which introduce a current and measure the resistance to it, and gamma measurements, which log natural background radiation. Sibray said scientists have also been measuring hole-size diameter with a caliper tool and borehole fluid temperature and resistivity. All these produce measurements that vary according to the types of sediments and fluids logged.

management, policy and wildlife. Teams ranked after Cambridge were from Nelson, Norris, Neligh-Oakdale and Alliance, in that order. Besides CSD, other co-sponsors were the Lower Platte South, Nemaha, Papio-Missouri Rivers and Upper Elkhorn natural resources districts, the U.S. Natural Resources Conservation Service and Nebraska Forest Service, the state departments of Education and Environmental Quality and the state Game and Parks Commission. The first state competition was held in 1992.

CALMIT's associate director given award by remote sensing group of AAG

The associate director of the University of Nebraska-Lincoln's center for geographic information systems and remote sensing has received an award for outstanding achievements from the remote sensing group of the Association of American Geographers, the nation's most prestigious professional society for geographers.

Jim Merchant, research geographer with the Center for Advanced Land Management Information Technologies of the UNL Conservation and Survey Division and School of Natural Resource Sciences, received the Outstanding Contributions Award presented by the association's Remote Sensing Specialty Group. The award is given for service to the remote sensing group and the association, as well as for career achievements in the discipline. The award has been given annually to one or two geographers each year.

Among other contributions, the Institute of Agriculture and Natural Resources researcher has been a principle investigator

on a global land-cover characterization project that has received considerable professional acclaim. The dynamic digital data base groups similar land-cover and land-use areas and characterizes them by various seasonal attributes, such as onset, peak and length of "greenness," a measure of photosynthetic activity. NASA and the U.S. Geological Survey's remote sensing and geographic information systems data center in Sioux Falls, So. Dak., have been important cooperators on the project.

In the past five years, Merchant and colleagues have received a number of honors and awards related to the land-cover work. Among them, in 1993, they received the ERDAS Award, given by a leading geographic software company in Atlanta, ERDAS, for the best paper published in Photogrammetric Engineering and Remote Sensing, a leading professional journal; the paper explained the project's techniques. And in 1997, he was given the John Wesley Powell Award by the USGS for contributions to advance the mission of that survey.

University of Nebraska-Lincoln

James C. Moeser, *Chancellor*

Institute of Agriculture and Natural Resources

Irvin T. Omtvedt, *Vice Chancellor*

Conservation and Survey Division

Perry B. Wigley, *Director*

Duane Eversoll, *Associate Director*

Donald C. Rundquist, *Director, CALMIT*

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Resource Notes is a quarterly publication of the Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588-0517. To receive it free of charge, write to the address above. *Resource Notes* includes the tri-quarterly newsletter, previously called *Resource News*, and the CSD annual news magazine, the fall edition of the news package. Volume and number now conform to the publishing history of the magazine. The Conservation and Survey Division (CSD) is the agency designated by statute to investigate the natural resources of the state, to make available to the public the results of these investigations and assist in the development and conservation of these resources. CSD provides information to all people regardless of sex, age, race, color, religion, national origin, sexual orientation, veteran's status or handicap. Background of nameplate depicts the rock column from the *Geologic Bedrock Map of Nebraska*. Shown are (from bottom) Precambrian, Cambrian, Ordovician, Silurian and Devonian rocks.

Electronic democracy *continued from p. 1*

ing video clips that simulate light or heavy traffic and even provide examples of noise for those traffic levels.

Another feature of this collaborative planning, he said, is a box provided alongside images and maps that allows for citizen responses that could be site-specific and informed in detail on the planning issue in question. Access to such information could be through a Web site with a GIS program or vice versa, he added.

Shiffer, director of the Computer Resource Laboratories of the urban studies and planning department at MIT, also consults internationally. He spoke on "Convergence of GIS and Multimedia for Planning Support." The symposium was also supported by the Center for Advanced Land Management Information Technologies (CALMIT), a unit of CSD and the UNL School of Natural Resource Sciences, and a number of co-sponsors.

Benefits of this kind of community planning, could also include "desktop video-conferencing," available with software priced below \$150, he said. Such connections are eliminating time and place constraints on the democratic process; providing instant progress reports and updates on projects; and allowing for a broader reach involving more constituents. Some drawbacks are that these are rapidly evolving tools and protocols, and few people can keep up with the rate of changes; access does not include all people, excluding those who don't have personal computers or access to them, especially the poor; and that institutions need to make a commitment of personnel and dollars to keep such information updated.

Division gets \$25,000 for start of CSD part of urban geologic mapping near Omaha

A recent addition to the faculty at the University of Nebraska-Lincoln Conservation and Survey Division (CSD) has received \$25,600 from the U.S. Geological Survey to do geologic mapping in the Omaha area. Research geologist Joe Mason will begin mapping surface deposits north of Omaha this spring as a key contribution to the division's urban geology project.

The USGS has begun its mapping and will concentrate on the central Omaha and Council Bluffs area as its part of the cooperative project, Mason explained.

Mason's specialties include glacial deposits, such as those in eastern Nebraska, and the state's world-class wind-blown silt sediments known as "loess," common in the eastern and central parts of the state. Outside of western Iowa, which has substantial loess but less than Nebraska, only China has comparable deposits.

The scientific aspects of this study are as interesting as the more practical considerations, such as mapping compressible sediments known for their capacity to complicate construction of building foundations and understandings of contaminant

While the technology is here and will only get more sophisticated, important policy questions that emerge with it are: Who will pay for it? How do we match the technology with the community's resources? And what are the best delivery systems? Some possibilities for the latter include Internet "cafes," local computer centers, libraries or private home-based or hand-held computers, Shiffer said. An ethical issue involves who supplies the representations used in such programs and who evaluates them, as well as how are biases detected or redressed.

The symposium's unique format offered the traditional lectures, but much of it was devoted to working meetings in which individuals with similar responsibilities identified and tried to solve shared problems. Groups were first arranged by various segments of the industry, such as property assessment, public works, transportation, utilities and agriculture, according to Jim Merchant, CALMIT associate director.

Next, the issues identified were the focus for people sharing the same issues, even though they may work in different parts of the industry. To finish up, action groups of participants from the same sectors outlined steps to address specific problems. Progress on solving them will be addressed at the next such symposium two years from now, Merchant said.

Among the other sponsors were the Iowa, Kansas, Missouri and Nebraska GIS steering or advisory bodies, Nebraska's Department of Environmental Quality and Natural Resources Commission, the USDA Natural Resources Conservation Service and the U.S. Geological Survey. CALMIT and Lincoln/Lancaster County received awards given by the event's planning consortium for outstanding contributions in GIS.

movement, he said. In many areas, water moves down through the more permeable loess and mounds on top of the underlying glacial deposits. Moreover, they are intricately interbedded and variable in the far eastern part of the state.

The historical geology of the region, when combined and correlated with central Nebraska loesses, creates a complex and somewhat mysterious scenario. Little is known about the exact source areas for the loess. And while some dating of ash beds has yielded a few absolute dates, much more needs to be done to determine the ages of both kinds of deposits, he said.

Some previous work by former CSD geologist John Boellstorff in the 1970s resulted in important ash dates and a great deal of test-hole logs and other notation. He also contributed a few highly significant publications revising the glacial stratigraphy of eastern Nebraska. Mason looks forward to building on the Boellstorff legacy and developing and more complete analysis of the sediment history, he said, a process he thinks might take about 10 years or more.

In addition, Mason will be working on evidence of climate change in central Nebraska loesses over the past 2 million years.

CALMIT gets grants for teaching and research lab and space-data education project

The University of Nebraska-Lincoln's center for remote sensing and geographic information systems has received two large grants that will enhance geographical education of K-12 and post-secondary students, as well as providing a teaching and research facility for researchers outside the center itself.

The Center for Advanced Land Management Information Technologies (CALMIT) has been awarded a \$357,000 "Center of Excellence" grant from NASA to provide advanced computer and laboratory equipment for an "Environmental Monitoring Lab," the location of which remains to be determined. CALMIT,

administered by the Conservation and Survey Division and the UNL School of Natural Resources (SNRS), received the grant, but it was submitted by the UNL Remote Sensing Consortium, a group including CALMIT, SNRS and engineering college faculty. Members outside of CALMIT requesting the grant included Fernando Echavarría of the geography department; Ram Narayanan of the electrical engineering department; Stephen Reichenbach of the computer science department; and Betty Walter-Shea of the SNRS.

The grant provides no money for research staff or expenses but fills a need for funding of a teaching and research facility that could be used by departments outside of CALMIT, according to Don Rundquist, CALMIT director.

In addition, CALMIT's Consortium for the Application of Space Data to Education (CASDE) has received a third year of funding from NASA, garnering a \$348,000 award to continue finding applications for federal remote sensing data, as well as for other such data from state and local sources, in K-12 interdisciplinary education. CASDE also has a new coordinator, Rick Perk, replacing Brian Tolk, who took a job with CALMIT's close federal cooperator, the Earth Resources Observation Systems Data Center in Sioux Falls, So. Dak. The coordinator manages

the space-data project and its spinoff, Virtual Nebraska, a collection of remote sensing imagery, both current and historical, for most of Nebraska's towns and their surrounding areas. This year, University of Nebraska at Omaha Teachers College replaces the Johns Hopkins University in Baltimore as a CASDE cooperator. The Jet Propulsion Laboratory at the California Institute of Technology in Pasadena has been the other partner.

In another development, CALMIT has been named a NASA Regional Application Center (RAC) for data from the Goddard Space Flight Center of Greenbelt, Md. It joins about a dozen other universities as a partner in meeting objectives for development and distribution of satellite information. Jim Lacy, CALMIT's facilities manager, coordinated with NASA on the RAC partnership. The application centers will be involved in testing and finding uses for data generated through the Earth Science Enterprise program, formerly Mission to Planet Earth, as well as gaining access to Goddard data-base management tools. CALMIT will also assist in ground-truth validation of satellite data, something few other such centers are doing, Lacy said. Lacy will visit Goddard this summer to learn more about in the specific dynamics and nature of the program.

Wigley to resign as director of Conservation and Survey Division on July 1

The director of the University of Nebraska-Lincoln's natural resources survey will resign July 1 and pursue research in groundwater, urban and petroleum geology as a faculty member of the survey.

Perry Wigley came to the UNL Conservation and Survey Division in 1987 from Texas Eastern Exploration Co. of Houston, a petroleum exploration and production company, where he was exploration manager and chief geologist for on-shore North America. CSD is the state geological, water and soil survey and also supports a center for geographic information systems cooperatively with the UNL School of Natural Resource Sciences.

Previously, Wigley had headed up a consulting firm in engineering, coal and petroleum geology, had been a professor of geology at Eastern Kentucky University in Richmond, Ky., and served as assistant director of the Georgia Geological Survey in Atlanta.

"It has been a honor to serve the people of Nebraska. We are especially proud of our joint efforts with the natural resource districts and other state agencies," he said.

One of the division's accomplishments during his tenure as director has been the transition from a survey with mostly scientists with master's degrees to one dominated by faculty with doctorates conducting advanced research and investigations, Wigley noted. Others have been an increase in outside funding from about 10 percent to nearly 40 percent of the division's budget; strengthening programs in groundwater, geographic information systems and urban and near-surface geology; and enhancing cooperative projects and data-sharing with other agencies.

"We greatly appreciate the leadership Dr. Wigley has provided for the Conservation and Survey Division and the accomplishments of that unit during his 11 years as director. We look forward to his continued service with his unit in research and outreach," said Irv Omtvedt, vice chancellor of the Institute of Agriculture and Natural Resources, of which CSD is a part.

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