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Landslide analysis, other data highlight Lower Platte Alliance work

A coalition to guide land use and assist local control along the lower Platte River corridor will have better information on landslides, mineral resources and geologic bedrock due to analysis done by the Conservation and Survey Division.

Along with test-hole records for eight corridor counties, containing basic data related to groundwater and geology, the division has delivered a mineral resource inventory, a detailed geologic bedrock map and an analysis of steep slopes and landslide potential in a geographic information system.

This landslide work is especially important as people develop lots on bluffs with the potential to slump or slide into the valleys in the area, explained Duane Eversoll, CSD associate director and landslide researcher.

"The map of landslide potential and steep slopes is to encourage on-site investigation before people develop a spot, not to stop development," Eversoll said. "They do need to know that they probably shouldn't have a sprinkler system and to channel drainage away from the sensitive area."

They should also use other landslide mitigation efforts, he added.

The minerals inventory helps outline sand and gravel deposits of potential use in building or road construction before development covers them up. Such deposits need to be mined near where they are used to be economically feasible, Eversoll explained. The geologic bedrock map and minerals inventory were developed by Ray Burchett, a CSD geologist

Platte alliance continued on next page

'Seeing' vegetation in green as people do focus of remote sensing work; CALMIT hires physicist who won major awards in Soviet Union and Israel

A recent addition to the faculty of the University of Nebraska-Lincoln has been pioneering a way to "see" healthy vegetation the way humans beings do, using the green part of the visible spectrum. Anatoly Gitelson, the first physicist to be hired by UNL's Center for Advanced Land Management Information Technologies (CALMIT), believes that green channel reflectance has excellent potential in monitoring the mature stages of vegetation growth, in detecting the early stages of plant stress and perhaps in predicting yield.

From its early days in the 1960s and 1970s, remote sensing — a means of gathering data about earth conditions from a distance — has relied on information from many parts of the visible and invisible spectrum of electromagnetic radiation, from thermal infrared to radar.

In sensing vegetative conditions, however, it has depended largely on data from the bands of the spectrum plants reflect well, the infrared and near-infrared. This part of the spectrum has contributed the most to popular vegetative condition maps that represent ground conditions either in false color, resembling color-infrared photography and showing healthy plant growth in bright red, or in more realistic greens, tans and browns.

"When red and blue reflectance are saturated in green vegetation, the green channel remains quite sensitive to vegetation fraction, leaf area index, chlorophyll content and plant vigor," Gitelson explained. "Therefore, we can use this channel to retrieve quite accurately very important characteristics of vegetation, like prediction of yield, for example. It's been

Gitelson continued on next page

CSD hosts first midcontinent meeting of Earth Science Information Centers

The Nebraska Earth Science Education Network (NESEN), a award-winning program aimed an enriching K-12 Earth science education, makes considerable use of materials available through the state-federal Earth Science Information Centers (ESICs), just one of their many important contributions, according to Dave Gosselin, NESEN director and geologist with the University of Nebraska-Lincoln. These centers are the statewide distribution outlets for all federal earth science information in a given state of origin.

Gosselin, researcher with the Conservation and Survey Division (CSD) and professor with the School of Natural Resource Sciences (SNRS) spoke at the first regional meeting of the midcontinent ESICs. NESEN is a joint program of CSD and the SNRS at the university.

Representatives from 10 of the 15 states in the midcontinent region convened at CSD during the first week of April to discuss issues related to the ESIC program, a means by which the U.S. Geological Survey, responsible for all federal geologic and geo-

graphic information, distributes this data in the states where it is gathered.

Rick Perk, education coordinator for the UNL Center for Advanced Land Management Information Technologies (CALMIT), presented on CALMIT's educational ventures, including the Consortium for the Application of Space Data to Education and some of its key applications.

These include Virtual Nebraska, a archives of historical and recent aerial and ground photography of Nebraska towns and their surroundings; DataSlate, a special geographic information system for use in K-12 education; and the newest project, America's Farm, designed to bring real-time data on farm conditions and operations into high school and college classrooms via the Internet. CALMIT is also a joint UNL program of the division and the natural resources school.

Other speakers were from the ESIC program in Reston, Va.; the USGS Mid-continent Mapping Center at Rolla, Mo.; and the USGS Earth Resources

ESICs continued on next page

Map of center-pivot irrigation systems published for one year through co-op hydrology study

Center-pivot irrigation systems in Nebraska have increased 59 percent between the end of 1988, the last year in which data was compiled, and the end of 1997, the most recent data available, from 26,741 to 42,444 systems.

This tabulation is the result of the Conservation and Survey Division (CSD) reviving its annual inventory and map of center-pivot irrigation systems in Nebraska. Last published in 1990 through the CSD Center for Advanced Land Management Information Technologies (CALMIT), the inventory ended due to a lack of outside funding.

"We got partial funding for the map through a cooperative project called the 'Platte River and Basin Cooperative Hydrology Study', but it's only for one year," explained Marcus Tooze, research coordinator with CALMIT and principal investigator of the part of the study analyzing land use that contributed the inventory. This study involved CALMIT and was sponsored by two public power districts

Center pivots continued on next page



Platte alliance *continued*

emeritus. The bedrock map contributes to an understanding of the groundwater geology and minerals use, among other applications, and the minerals inventory maps sand and gravel, limestone and shale.

"Technical expertise brought to the table by organizations like Conservation and Survey has been invaluable to the work of the alliance, helping us protect interests and resources along the corridor," said Greg Fetterman, the alliance coordinator.

As part of an agreement signed in the fall of 1998, the Lower Platte River Corridor Alliance gave the division a \$31,000 grant to do the resource-analysis work by a spring 2000 deadline. CSD matched these funds with contributions valued at \$35,735. The alliance, formed in 1995, is a coalition of three natural resources districts (NRDs) in the area and six state agencies, as well as CSD. Defining the corridor as the river, its bluffs and adjoining land, it stretches from Columbus to the river's mouth at Plattsmouth. Rural domestic and urban water users, irrigators and rural water systems all have a stake in the management of the area's natural resources, as do mining, recreation and commercial interests. The alliance's mission is to foster local approaches to protecting the river's ecosystem while balancing this with development.

Gitelson *continued*

confirmed that it's possible to assess the vigor of vegetation, early stages of stress, etc."

The previously most-used method of assessing these conditions, called the normalized difference vegetation index, is best up to about 50-60 percent of the vegetation fraction, a term referring to the percentage of total expected ground cover. Green channel reflectance can be used effectively to fill this gap, explained CALMIT Director Don Rundquist.

Rundquist said he was very pleased to be instrumental in the hiring of Gitelson, an internationally known scholar with more than 125 scholarly publications and two awards from the former Soviet Union for the best work of the year in physics. Last year he also received an award in Israel, where he emigrated in the early 1990s, for outstanding work in remote sensing.

Rundquist met Gitelson at an international conference in Miami in 1994, and he and CALMIT colleagues and affiliates began working cooperatively with him and his colleagues the next year through the U.S.-Israeli Bi-National Science Foundation. The work involved developing remote sensing methods for estimating con-

ESICs *continued*

Observation Systems Data Center of Sioux Falls, So. Dak. Other topics discussed were the business partners program; resources available to ESIC; cost-setting for these resources; sharing market-

Center pivots *continued*

and five natural resources districts, as well as the state Department of Water Resources and its Natural Resources and Game and Parks commissions.

Counties with more than 500 pivots that had the highest percentage increases were: Cuming — 313 percent, from 128 to 529; Merrick — 159 percent, from 348 to 903; Hall — 145 percent, from 240 to 588; Platte — 118 percent, from 519 to 1,132; and Polk — 102 percent, from 289 to 519. Lindsay Manufacturing of Lindsay con-

The purpose of the CSD effort is to assist local and regional planning by delivering information in the form of computerized geographic information systems (GIS) that allow the alliance and its member organizations to easily make use of the data, Eversoll said.

The steep slope and landslide potential work was done by Eversoll, Francis Belohlavy, a CSD soil scientist, and Les Howard, the CSD GIS specialist who oversaw development of the GIS data bases. Howard and Eversoll walked the area looking for new landslides, Howard explained. Using global positioning system technology to precisely locate all landslides, they also examined slopes steeper than 30 percent in relation to soil parent material — data compiled by Belohlavy on the geologic media from which soil is formed. This data was put into a GIS that compiles a variety of data bases and allows the user to pull out one or more, or combine them, to suit a specific problem or analysis, Howard said.

Other alliance members are the Lower Platte North, Lower Platte South and Papio-Missouri Rivers NRDs, as well as the state Natural Resources and Game and Parks commissions and its departments of Water Resources, Health and Human Services, Environmental Quality and Military.

centrations of algae in lakes and ponds and was conducted in the United States and Israel.

Various exchanges and cooperative work with Gitelson and colleagues led Rundquist to suggest he might consider working for CALMIT, a joint program of the Conservation and Survey Division and the School of Natural Resource Sciences. Gitelson spent part of his sabbatical in Lincoln during 1999 and was officially brought on board with UNL in late February.

Gitelson's work in green channel reflectance and on remote sensing of vegetation in general will be an important contribution to CALMIT's ongoing investigations into precision or computer-assisted agriculture, Rundquist said.

He also will continue to work on remote sensing of water quality and on the effects of climate change on vegetation, Gitelson said. Nebraska has a moisture gradient that decreases from east to west and can be used as an indicator of environmental change. He has experience with such monitoring as Israel has a similar gradient that runs from north to south, he added.

ing ideas; and networking resources among Earth Science Information Centers, explained Judy Otteman, CSD map and publication sales manager and Nebraska's ESIC representative.

tributed partial funding for the 1997 data, but future inventories will depend on more outside funding, explained Mark Kuzila, CSD director.

The map is available from CSD for \$5 plus \$3 shipping and handling for a folded map, or \$4 for an unfolded map in a tube, both first class. Call or write: Map and Publication Sales, Conservation and Survey Division, 104 Nebraska Hall, University of Nebraska-Lincoln, 68588-0517; or e-mail: csdsales@unl.edu; or phone (402) 472-7523.

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