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## Nebraska Earth Systems Education Network – Winter 2005/06

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### UNL Expands Teacher Education in Earth Science

by Monica Sanford



A unique partnership has been formed between Dr. Dave Gosselin of UNL's School of Natural Resources, Dr. Ron Bonnstetter of the College of Education and Human Sciences, and Dr. Tim Slater of the University of Arizona. These faculty, working with Susan Kelly, an educational consultant at UNL, have created an online, 8-week, 3-credit graduate course targeting K-6 science teachers. The four-module course will improve knowledge of Earth science content using practical classroom approaches.

Scholarships are available for the first 25 students. The first 15 will receive free tuition, a \$598.50 value, and the next 10 will receive half of the tuition paid. Fees (distance education, technology, and library) of \$85.50 and a registration fee of \$20 will be the responsibility of the student. There is a 35 student limit for the class.

Teachers are encouraged to participate as teams to provide support for each other, to build a sense of community within the schools, and to promote vertical alignment of curriculum among different grades so that the older students can mentor younger students. Individuals are still encouraged to participate.

The course will be comprised of four modules: 1) Prelude to Laboratory Earth, an introduction to the details of the course, how-to tutorials, and accessing and manipulating data; 2) Principles and Concepts, which includes application of density, convection, and gravity to understand Earth's four spheres; 3) Earth in Space, which will focus on the Earth and other members of the solar system; and 4) Weather and Climate, which includes understanding weather patterns, the greenhouse effect, and data interpretation.

To enroll you must first be admitted to UNL as a Degree, or Non-Degree Post-Baccalaureate, or Non-Degree Visiting Graduate Student. You can apply online at <http://www.unl.edu/gradstudies>. Once admitted, you can use your student ID and PIN to enroll online. The course is NRES 896a Independent Study: Lab. Ear. Concept & Appl. for 3 credits; section number 700; call number 8696.

For more information, visit the NESEN website (<http://nesen.unl.edu>), contact Dr. Dave Gosselin by emailing him at [dgosselin2@unl.edu](mailto:dgosselin2@unl.edu) or calling 402-472-8919, or his assistant Monica Sanford at [msanford2@unl.edu](mailto:msanford2@unl.edu) or 402-472-0773.



### UNL Monitoring Program Records Persistent Groundwater Declines

By Steve Ress

Five years of drought have steadily diminished the state's groundwater resources, according to monitoring by University of Nebraska-Lincoln researchers.

"We're very fortunate to have the extent of groundwater resources that we do, yet the persistency of the declines in aquifer groundwater levels in aquifers underlying Nebraska are becoming increasingly more obvious as the current drought continues," said Mark Burbach, an assistant geoscientist in UNL's School of Natural Resources.

Burbach coordinates UNL's statewide groundwater-level monitoring program that collects aquifer water-level data from more than 5,400 wells across Nebraska. The data is used to annually produce color maps showing rises and declines in groundwater levels. The maps typically show the changes in terms before the development of irrigation, generally regarded as 1952, to the present and over the past year.

Earlier this year, Burbach published a third map showing changes in aquifer levels from spring 2000 to spring 2005, the period of the current drought that has swept the state.

"From this map, it's very easy to see large areas of the state showing groundwater-level declines of up to five feet. In some areas corresponding to the heaviest concentrations of irrigation wells, declines of up to 20 feet over the past five years are not uncommon," Burbach said.

Many of the largest declines are in the heavily irrigated Platte, Republican, Lower Loup, Blue and Elkhorn river basins. as well as further west

in Box Butte and Cheyenne counties.

Only a few isolated areas of the state showed minimal rise in groundwater over the past five years, notably in Valley, McPherson and Gosper counties.

"These persistent and growing declines in the aquifer over a large area of the state are due mainly to current drought conditions and resulting increases in groundwater pumping for irrigation," Burbach said.

To produce the maps, spring water level information from more than 5,400 irrigation, domestic, observation and monitoring wells in all 23 of Nebraska's natural resources districts is compiled. Although most are NRD wells, some belong to the U.S. Geological Survey, Central Nebraska Public Power and Irrigation District, the U.S. Bureau of Reclamation and UNL.

"The number of wells grows each year. We're always looking to add wells with good potential to contribute to the accuracy of our data," Burbach said.

Well readings used to produce the maps generally are taken between March 1 and May 1 each year, after the fall and winter recharge cycle and before the summer irrigation season, he said.

The UNL program wants to make more of the information it collects available in real-time, via the Internet.

To that end, Burbach and two coresearchers have begun a partnership with the U.S. Department of Agriculture's Risk Management Agency that will



place satellite uplinking equipment on 52 wells across Nebraska. Most of the wells fitted with the equipment will be located in unconfined aquifers or shallow, confined aquifers that respond to climatic fluctuations, he said.

Coresearcher Byrav Ramamurthy of UNL's Computer Science and Engineering Department will oversee a doctoral student who will develop computer hardware and software to download, store and display groundwater-level readings from the wells which the public will also be able to see in a real-time format, he said.

In addition to benefiting groundwater-level monitoring, data from the wells will be incorporated into state and national drought-monitoring archives to improve drought planning and response.

Coresearcher Cody Knutsen of UNL's National Drought Mitigation Center will develop workshops for decision makers and the public on how to access and interpret the program's collected information.

The program will be developed over the next three years, Burbach said.

Copies of the groundwater-level change maps, including historical copies dating to 1954, can be accessed at <http://csd.unl.edu>. The groundwater-monitoring level program at UNL dates from 1930.

### GEON Summer 2006 Workshops

Geographic Educators of Nebraska (GEON) will be offering three major workshops and institutes and several smaller lectures during the summer of 2006. The primary objective of GEON is to help students realize the importance of geography in an increasingly interconnected and interdependent world. The workshops are:

1. Sandhills Journey -- a geography and history of Nebraska's Sandhills region. Meets new Nebraska Studies certification requirements. June 11-15th and July 8, 2006, beginning in Kearney for orientation. \$250 stipend for approved lesson plan.
2. Middle East Virtual Institute (MEVI) - June 23rd through July 15th in Omaha. Most work done by computer at participants' homes. June 23rd and then July 14 and 15 in Omaha. Field trip on the 14th in Omaha to visit ethnic restaurants, Muslim Religious Center, and Jewish Community Center. \$300 for approved lesson plan.
3. Mapping Technology for Nebraska, K-12 Teachers -- July 9-13, 2006, at Wayne State College. Room and board will be paid, in addition to a stipend for a completed lesson plan.
4. Nine other one-day workshops on Earth science and geography awareness to be announced later and to occur throughout the state from Scottsbluff, to Norfolk, to Lincoln and to Omaha.

Contact Chuck Gildersleeve at UNO for further details: [cgildersleeve@mail.unomaha.edu](mailto:cgildersleeve@mail.unomaha.edu).



# Nebraska Earth Systems Education Network

## Newsletter Winter 2005/06

### **AmericaView and NebraskaView Make Geospatial Information More Useful to All**

**Editor's Note:** In September, the Center for Advanced Land Management Information Technologies (CALMIT), of the UNL School of Natural Resources (SNR), displayed posters of and offered Internet access to NebraskaView at the Nebraska State Fair and the annual ag expo known as Husker Harvest Days in Grand Island. NebraskaView is perhaps most well recognized for its creation and distribution of "Satellite View of Nebraska" – a "false color" composite image of the state's land use and land cover displayed as a poster. NebraskaView has also been exhibited at events such as the Big Red Roadshow, a UNL recruiting project, and the Central Plains Severe Weather Symposium.

Jim Merchant, associate director of CALMIT, and Milda Vaitkus, CALMIT GIS specialist, also presented on NebraskaView and its national partner, AmericaView, at the 2005 Nebraska GIS Symposium, a biennial event held in May in Lincoln and sponsored by the Nebraska GIS/LIS Association, CALMIT, the SNR and many other organizations. A summary of that talk is presented next. These two programs help citizens, businesses and educators make good use of huge stores of geospatial data available from the federal government. For more information, contact principle investigator James Merchant, CALMIT, University of Nebraska-Lincoln (jmerchant1@unl.edu) or project manager Milda Vaitkus, CALMIT, University of Nebraska-Lincoln (mildav@calmit.unl.edu).

### **New Educator Pricing 25% - 40% Off!**

Nebraska Maps and More, formerly the School of Natural Resources Map and Publication Store, has a new web address:

**<http://nebraskamaps.unl.edu>**

Educators receive 25 percent off their first copy of any product in the store (use discount code educator25).

Want a copy for every student in your class? If you order 10 or more of a single product, you will receive 40 percent off the purchase of that product (use discount code educator40).

When checking out, you must enter the appropriate discount code(s) in the "Discount or Gift Certificate Code" box to receive the discount(s).

This special discount is valid February 1, 2006, to December 31, 2006.

Nebraska Maps and More  
(SNR Map and Publication Store)  
102 Nebraska Hall  
University of Nebraska-Lincoln  
Lincoln, Nebraska, 68588-0506  
Voice 402-472-3471  
Fax 402-472-4608  
<http://nebraskamaps.unl.edu> (web)





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### NebraskaView and AmericaView Cooperators in Distributing Geospatial Information

by Charles Flowerday

AmericaView (AV; <http://www.americaview.org/>) distributes satellite data and remote sensing technologies in support of applied research, K-16 education, workforce development, and technology transfer. It is administered through a partnership between the U.S. Geological Survey (USGS) and the AmericaView Consortium, its main partner. AmericaView is comprised of two complementary and interrelated activities of the partners.

AmericaView provides data infrastructure, processing and delivery and is administered by the USGS Land Remote Sensing program, which is carried out at the USGS Earth Resources Observation System Data Center in Sioux Falls, S. D. An AmericaView consortium is comprised of university-led organizations working together to build a national user network.

NebraskaView (<http://nebraskaview.unl.edu/>) is the state node for AmericaView (AV). The Center for Advanced Land Management Information Technologies (CALMIT; <http://www.calmit.unl.edu>) is the NebraskaView site, which provides geospatial data to users in Nebraska. CALMIT provides access to geospatial data, conducts applied research and training, offers assistance in applications development, and fosters technology transfer. Its seeks to ensure that Nebraskans - - for example, state and local agencies and K-16 educators -- make the fullest use of geospatial data products, such as Landsat images, digital aerial photographs, and digital elevation data, and technologies such as computerized mapping called geographic information systems (GIS). NebraskaView's partners include the Nebraska

GIS Steering Committee, the Nebraska Space Grant Consortium, University of Nebraska-Omaha and Creighton University.

NebraskaView educational programs such as short courses and web training are being enhanced (<http://nebraskaview.unl.edu/neview03.htm>) and we are working with other units of the University of Nebraska to promote the integration of geospatial technologies into the university curriculum. Educational resources and links to free software are also available at <http://calmit.unl.edu/calmit/training.htm>. NebraskaView is working with the Nebraska GIS Steering Committee to identify priorities for use of this data. For more information, see: <http://calmit.unl.edu/calmit/research.htm>.



### **Tern and Plover Job Shadowing Program Gets First Two Students Going**

by Charles Flowerday

The Tern and Plover Conservation Partnership began its new job shadowing program for older high school and younger college students this year.

Expected to run at least three to five years, the program gives science- and conservation-minded youth a look at a proactive conservation program that protects endangered least terns and threatened piping plovers along the Platte River, Chris Thody explained. Thody is the volunteer coordinator for the partnership, which is sponsored by the School of Natural Resources at the University of Nebraska-Lincoln and a number of other organizations. The partnership includes a volunteer program called "Adopt-a-Colony," and the students work with that program.

Two students were accepted this year and the program hopes to be able to accommodate up to 10 students, 16 years or older, as it ramps up in future years. Jacob Blacketer of LaVista High School and Molly Staley of Lincoln Northeast High School were chosen this year.

They will work as volunteers for a minimum of two days a week, one in the partnership's office at the SNR and one in the field with technicians performing a variety of duties. These range from setting up signs and fences protecting tern and plover colonies to mylar flags designed to deter birds and to keep them away from active mining areas used by sand-and-gravel companies.

"It's a really good program. It gives you an idea of what fieldwork is like," said Molly Staley of Lincoln Northeast High School. "I liked getting out with a technician and having the hands-on experience."

Jacob Blacketer of LaVista High School said, "It's

a good program with lots of hands-on activities. I learned a lot from it."

The program is open to anyone interested who has some interest and a little background in science. Another requirement is that students need to have transportation to get them to the University. Program staff will provide transportation from the University to job sites outside Lincoln.

"We send out the information in March to southeastern Nebraska high schools for a program that starts in June," Thody said.

Students interested in the program should talk to their high school guidance counselors and career planners about the applications or contact Chris Thody at: 313 Biochemistry Hall, Lincoln, NE 68583-0759; phone: (402) 472-8741; fax: (402) 472-8390; e-mail: cthody2@unl.edu. Applications are accepted through May, Thody said.

The Tern and Plover Conservation partners include: Nebraska Game and Parks Commission (NGPC), University of Nebraska Cooperative Extension (UNL), Lyman-Richey Corporation, Western Sand and Gravel, Arps Gravel and Concrete, Overland Sand and Gravel, Mallard Sand and Gravel, Girl Scouts - Great Plains Council, the Nebraska Environmental Trust, US Fish and Wildlife Service, and the National Fish and Wildlife Foundation. The program is funded by the Nebraska Environmental Trust, the U.S. Fish and Wildlife Service and the National Fish and Wildlife Foundation.



### **International Workshop Fosters Collaboration to Improve Teaching of Hydrogeology** by Charles Flowerday

Addressing a host of issues related to undergraduate education about groundwater geology was the focus of a special workshop for professors of hydrogeology held at the University of Nebraska-Lincoln July 23-28. "On the Cutting Edge – Teaching Hydrogeology," was part of a five-year series of workshops and resource gathering on undergraduate education in the geosciences funded by the National Science Foundation and co-sponsored by the National Association of Geoscience Teachers. Attendees compiled materials called "Resources for Teaching Hydrogeology."

"At last summer's workshop and this summer's, we've had 15 to 20 percent of the people who teach the subject in all the Earth science departments in the country," explained Barbara Tewksbury of Hamilton (N.Y.) College, a co-convenor with F. Edwin Harvey of the University of Nebraska-Lincoln's School of Natural Resources (SNR), Scott Bair of Ohio State University; Todd Rayne of Hamilton College and Donald Siegel of Syracuse University.

Other keynotes were plenary sessions on helping students visualize the material, incorporating groundwater projects into courses and how to train hydrogeologists for both field and classroom. Open-discussion demonstration sessions allowed participants to share ways to actively engage students in lab and class, as well as helping those with less experience do a good job of teaching groundwater basics. One workshop addressed "fear factors" in the discipline, particularly regarding chemistry and math. A one-day field trip showed how to integrate field work into courses. A listserv for further discussion is also available. A detailed

log of the workshop is at: <http://serc.carleton.edu/NAGTWorkshops/hydrogeo/index.html>.

"Another characteristic of the Teaching X series is that it's not just a few conveners. We bring about 70 people here to find out what's out there, what's working for them. Half of these people are presenting. It's not just the gurus telling people how to teach," Tewksbury said.

The workshop kicked off the first night with a panel discussion on: What should students be able to do as a result of having taken an entry-level hydrogeology course? Panelists included: Charlie Andrews of Papadopoulos and Associates; Mary Jo Baedeker of the U.S. Geological Survey (USGS), retired; Ann Bleed, deputy director of the Nebraska Department of Natural Resources; Nan Lindsley-Griffin, professor with the UNL geosciences department and past board member of the Association of State Boards of Geology (ASBOG), the oversight body for certifying geologists; and Donald Siegel of Syracuse University.

Summing up, Harvey said, "I thought of a lot of new ways to teach things. I learned a lot just as a participant. I also got more comments than I could count on how positive it was."